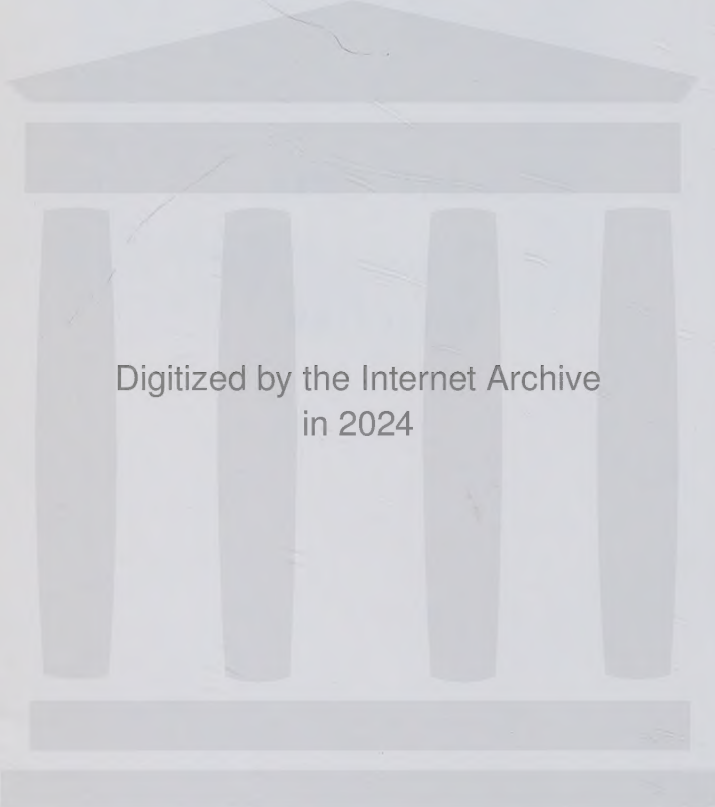




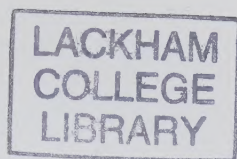
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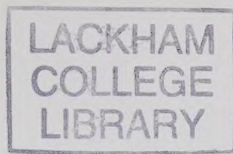
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School of Biological
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**AN ILLUSTRATED TAXONOMY
MANUAL OF WEED SEEDS**

By

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and

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Richard J. Delorit

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I dedicate this volume to the late Dr. K. P. Buchholtz, Professor of Agronomy, University of Wisconsin, whose personal friendship I treasured and whose contributions as a scientist and teacher I admired. His patience and courage served as an inspiration to all who knew him and particularly to those of us who had the privilege of being his students.

. and nothing teems
But hateful docks, rough thistles, kecksies, burs,
Losing both beauty and utility.
And as our vineyards, fallows, meads, and hedges
Defective in their natures, grow to wildness;
Even so our houses, and ourselves, and children,
Have lost, or do not learn, for want of time,
The sciences that should become our country.

—Shakespeare, *Henry V*, *Act V*, *Scene 2*, 1599

Preface

There are many different types of identification keys and various methods which can be used in developing them. The larger the number of contrasting features that exist between the material being treated the easier it is to develop and use the key. In identifying plants, for example, the characteristics of the leaves, stems, flowers, roots, and growth habit all can be used in making an identification. While it is not difficult to distinguish between the seeds of certain genera or species, only a limited number of characteristics are available to differentiate between many others. The task is further compounded by the small size of many seeds, the differences in maturity, the loss of certain parts and the change in the surface appearance caused by processing or handling, and the difference in size and color which occurs under different soil and climatic conditions.

The term seed, as used in this key, is not in all cases botanically correct. Rather, the term is used in referring to the seed unit which occurs in crop seeds. In a number of cases this may be both as a true seed and a fruit. For this reason both forms may be included in the key and the illustrations.

This seed key, which includes the seeds of 192 species of weedy plants, is intended for use by the inexperienced student of agronomy or botany and any individual interested in seed identification. One of the principal difficulties encountered by the "non-professional" in using a seed key is the uncertainty of the identification he has made. This is due in part to a lack of familiarity with the terms, failure to observe closely some features of the seed, a lack of general background in the area, and the fact that the description of one observer does not always convey the intended information to another observer. To aid the user, a color illustration of each species has been provided which can be used to check the accuracy of the identification. It will also be noted that the amount of descriptive material exceeds that of many keys. This has been done because the evidence is not always as "clear cut" in weed seeds as with other materials and it is believed that the additional information provides a more reliable basis for making the identification.

R. J. DELORIT

Acknowledgements

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The author is grateful to Mr. Verne Palmberg, Vice President of Sales, and also Miss Shirley Johnson and Miss June Mondeng, Registered Seed Technologists, Northrup King and Co., Minneapolis, Minnesota; and to vocational agriculture instructors Mr. K. W. Ware, Alliance, Nebraska; Mr. Harold White, Milbank, South Dakota; Mr. Wayne Ditmer, Mott, North Dakota; Mr. Clifton Wick, Pearl City, Illinois; Mr. Wm. Maurina, Barron, Wisconsin; and Mr. Richard Quast, Neillsville, Wisconsin, for providing some of the seed samples which are photographed in this publication.

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COLLECTING AND IDENTIFYING WEED SEEDS

Seed identification is a specialized area of agronomy. In addition to those individuals whose professional work or studies involve weed seed identification, a number of other people have learned that it is an inexpensive, educational, and satisfying hobby. Individuals who are interested in the study of weed seeds usually develop their personal seed herbarium. A wealth of seed material is available along the roadsides and countryside but a large number of species can also be collected in the cities. Since a weed is usually defined as a plant that is growing where it is not wanted, most collectors limit their collection to those species that are troublesome in field crops, nurseries, flower gardens, vegetable gardens, parks, or which adversely affect the health of man. Collecting seed specimens brings the collector in contact with the flora of the area and soon enables him to identify the plants as well as their seeds.

The seeds of most weedy species are ready for harvesting about one month after flowering. In making field collections of small samples, the usual practice is to gather the mature seed stalks and place them in envelopes. Each envelope should be labeled to show the date and place of the collection and also the common and scientific names if known.

Some specimens are dry enough to thresh immediately but others need to be placed in shallow, open containers for one or two weeks to allow further drying. After they have dried out, the specimens may be hand-threshed and the seeds will usually be dry enough to store. If the moisture content of the seeds is questionable, they should be allowed additional time in open storage.

Specimens of all, except the very large seeds, can be permanently stored in inexpensive glass or plastic vials ranging from one-half dram to two drams in size. Small, plastic boxes are used by some collectors. Each vial or box should be labeled or numbered. Because of the small size of the storage vials, it is usually best to number the vial and keep a record book of information pertaining to each numbered sample.

The identification of weed seeds need not involve extensive or expensive equipment. A hand or tripod lens with a magnification of 10X-12X, a teasing needle, forceps, and a millimeter scale are sufficient to identify most species. All of this equipment can be purchased for less than four dollars.

Weed Species Included in the Key

AIZOACEAE (Carpetweed Family)

Carpetweed

Mollugo verticillata

AMARANTHACEAE (Amaranth Family)

Water Hemp

Tumble Pigweed

Prostrate Pigweed

Redroot Pigweed

Spiny Pigweed

Acnidia altissima

Amaranthus albus

Amaranthus graecizans

Amaranthus retroflexus

Amaranthus spinosus

ASCLEPIADACEAE (Milkweed Family)

Eastern Whorled Milkweed

Common Milkweed

Dogbane

Asclepias verticillata

Asclepias syriaca

Apocynum cannabinum

BORAGINACEAE (Borage Family)

European Sticktight

Corn Gromwell

Hound's Tongue

Lappula echinata

Lithospermum arvense

Cynoglossum officinale

CANNABINACEAE (Hemp Family)

Hemp

Cannabis sativa

CAPPARIDACEAE (Caper Family)

Clammy Weed

Polanisia graveolens

CARYOPHYLLACEAE (Pink Family)

Corn Cockle

Mouse Ear Chickweed

White Cockle

Bouncing Bet

Cow Cockle

Sleepy Catchfly

Bladder Campion

Hairy Catchfly

Night Flowering Catchfly

Corn Spurry

Common Chickweed

Agrostemma githago

Cerastium vulgatum

Lychnis alba

Saponaria officinalis

Saponaria vaccaria

Silene anthirrhina

Silene cucubalus

Silene dichotoma

Silene noctiflora

Spergula arvensis

Stellaria media

CHENOPODIACEAE (Goosefoot Family)

Saltbush

Common Lambsquarters

Maple Leaf Goosefoot

Winged Pigweed

Kochia

Russian Thistle

Atriplex argentea

Chenopodium album

Chenopodium hybridum

var. *gigantospermum*

Cycloloma atriplicifolium

Kochia scoparia

Salsola kali var. *tennuiifolia*

COMPOSITAE (Composite Family)

Common Yarrow

Common Ragweed

Giant Ragweed

Corn Chamomile

Mayweed

Common Burdock

Spanish Needles

Devil's Beggarticks

Spotted Knapweed

Russian Knapweed

Oxeye Daisy

Chicory

Tall Thistle

Canada Thistle

Flodman Thistle

Achillea millefolium

Ambrosia artemisiifolia

Ambrosia trifida

Anthemis arvensis

Anthemis cotula

Arctium minus

Bidens bipinnata

Bidens frondosa

Centaurea maculosa

Centaurea repens

Chrysanthemum leucanthemum

Cichorium intybus

Cirsium altissimum

Cirsium arvense

Cirsium flodmani

COMPOSITAE (Continued)

Bull Thistle
Thoroughwort
Small Flower Galinsoga
Gumweed
Bitter Sneezeweed
Wild Sunflower
Orange Hawkweed
Spotted Cat's Ear
Poverty Weed
Marsh Elder
Tall Lettuce
Prickly Lettuce
Oxtongue
Tall Cone Flower
Blackeyed Susan
Prairie Dock
Perennial Sow Thistle
Annual Sow Thistle
Tansy
Dandelion
Meadow Salsify
Tall Ironweed
Cocklebur

Cirsium vulgare
Eupatorium serotinum
Galinsoga parviflora
Grindelia squarrosa
Helenium tenuifolium
Helianthus annuus
Hieracium aurantiacum
Hypochoeris radicata
Iva axillaris
Iva xanthifolia
Lactuca canadensis
Lactuca scariola
Picris echinoides
Rudbeckia laciniata
Rudbeckia serotina
Silphium terebinthinaceum
Sonchus arvensis
Sonchus oleraceus
Tanacetum vulgare
Taraxacum officinale
Tragopogon pratensis
Vernonia altissima
Xanthium pensylvanicum

CONVOLVULACEAE (Convolvulus Family)

Field Bindweed
Hedge Bindweed
Field Dodder
Small Seed Alfalfa Dodder
Ivy Leaf Morning Glory
Big Root Morning Glory
Common Morning Glory

Convolvulus arvensis
Convolvulus sepium
Cuscuta pentagona
Cuscuta planiflora
Ipomoea hederacea
Ipomoea pandurata
Ipomoea purpurea

CRUCIFERAE (Mustard Family)

Yellow Rocket
Hoary Alyssum
Indian Mustard
Wild Mustard
Black Mustard
Small Seed False Flax
Large Seed False Flax
Shepherd's Purse
Hoary Cress
Hare's Ear Mustard
Dog Mustard
Field Pepperweed
Virginia Pepperweed
Ball Mustard
Wild Radish
Tumble Mustard
Hedge Mustard
Field Penny Cress

Barbarea vulgaris
Berteroa incana
Brassica juncea
Brassica kaber
Brassica nigra
Camelina microcarpa
Camelina sativa
Capsella bursa-pastoris
Cardaria draba
Conringia orientalis
Erucastrum gallicum
Lepidium campestre
Lepidium virginicum
Neslia paniculata
Raphanus raphanistrum
Sisymbrium altissimum
Sisymbrium officinale
Thlaspi arvense

CUCURBITACEAE (Gourd Family)

Wild Cucumber

Echinocystis lobata

CYPERACEAE (Sedge Family)

Yellow Nutsedge

Cyperus esculentus

DIPSACACEAE (Teasel Family)

Teasel

Dipsacus sylvestris

EUPHORBIACEAE (Spurge Family)

Woolly Croton
Flowering Spurge
Leafy Spurge
Snow-on-the-Mountain
Nodding Spurge
Cypress Spurge

Croton capitatus
Euphorbia corollata
Euphorbia esula
Euphorbia marginata
Euphorbia nutans
Euphorbia cyparissias

GERANIACEAE (Geranium Family)

Red Stem Filaree
Carolina Geranium

Erodium cicutarium
Geranium carolinianum

GRAMINEAE (Grass Family)

Quack Grass
Wild Oat
Cheat
Downy Bromegrass
Field Sandbur
Large Crabgrass
Barnyard Grass
Goosegrass
Stinkgrass
Foxtail Barley
Nimblewill
Witch Grass
Fall Panicum
Giant Foxtail
Yellow Foxtail
Bristly Foxtail
Green Foxtail
Johnson Grass
Porcupine Grass

Agropyron repens
Avena fatua
Bromus secalinus
Bromus tectorum
Cenchrus pauciflorus
Digitaria sanguinalis
Echinochloa crusgalli
Eleusine indica
Eragrostis cilianensis
Hordeum jubatum
Muhlenbergia schreberi
Panicum capillare
Panicum dichotomiflorum
Setaria faberii
Setaria lutescens
Setaria verticillata
Setaria viridis
Sorghum halepense
Stipa spartea

GUTTIFERAE (St. John's Wort Family)

St. John's Wort

Hypericum perforatum

JUNCACEAE (Rush Family)

Wood Rush

Juncoides campestre

LABITAE (Mint Family)

Dragonhead Mint
Hempnettle
American Pennyroyal
Mother Wort
Water Horehound
Catnip
Heal All
Lanceleaf Sage
American Germander

Dracocephalum parviflorum
Galeopsis tetrahit
Hedeoma pulegioides
Leonurus cardiaca
Lycopus virginicus
Nepeta cataria
Prunella vulgaris
Salvia reflexa
Teucrium canadense

LEGUMINOSAE (Pulse Family)

Canadian Milk Vetch
Sensitive Pea
Wild Licorice
Black Medic
Narrow Leaf Vetch

Astragulus canadensis
Cassia nictitans
Glycyrrhiza lepidota
Medicago lupulina
Vicia angustifolia

MALVACEAE (Mallow Family)

Velvet Leaf
Venice Mallow
Common Mallow
Prickly Sida

Abutilon theophrasti
Hibiscus trionum
Malva neglecta
Sida spinosa

NYCTAGINACEAE (Four-o'clock Family)

Wild Four O'clock

Mirabilis nyctaginea

ONAGRACEAE (Evening Primrose Family)

Common Evening Primrose

Oenothera biennis

OXALIDACEAE (Wood Sorrel Family)	
Yellow Wood Sorrel	<i>Oxalis stricta</i>
PAPAVERACEAE (Poppy Family)	
Prickly Poppy	<i>Argemone mexicana</i>
PLANTAGINACEAE (Plantain Family)	
Bracted Plantain	<i>Plantago aristata</i>
Buckhorn Plantain	<i>Plantago lanceolata</i>
Broad Leaf Plantain	<i>Plantago major</i>
Black Seed Plantain	<i>Plantago rugelii</i>
POLYGONACEAE (Buckwheat Family)	
Prostrate Knotweed	<i>Polygonum aviculare</i>
Wild Buckwheat	<i>Polygonum convolvulus</i>
Common Smartweed	<i>Polygonum hydropiper</i>
Pale Smartweed	<i>Polygonum lapathifolium</i>
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>
Lady's Thumb	<i>Polygonum persicaria</i>
Red Sorrel	<i>Rumex acetosella</i>
Smooth Dock	<i>Rumex altissimus</i>
Curly Dock	<i>Rumex crispus</i>
Broad Leaf Dock	<i>Rumex obtusifolius</i>
PORTULACACEAE (Purslane Family)	
Common Purslane	<i>Portulaca oleracea</i>
PRIMULACEAE (Primrose Family)	
Scarlet Pimpernel	<i>Anagallis arvensis</i>
RANUNCULACEAE (Crowfoot Family)	
Small Flower Buttercup	<i>Ranunculus abortivus</i>
Tall Buttercup	<i>Ranunculus acris</i>
Bulbous Buttercup	<i>Ranunculus bulbosus</i>
Celery Leaf Buttercup	<i>Ranunculus sceleratus</i>
ROSACEAE (Rose Family)	
Rough Cinquefoil	<i>Potentilla norvegica</i>
Sulfur Cinquefoil	<i>Potentilla recta</i>
Wild Rose	<i>Rosa arkansana</i>
RUBIACEAE (Madder Family)	
Poor Joe	<i>Diodia teres</i>
Bedstraw	<i>Galium aparine</i>
SCROPHULARIACEAE (Figwort Family)	
Yellow Toadflax	<i>Linaria vulgaris</i>
Moth Mullein	<i>Verbascum blattaria</i>
Common Mullein	<i>Verbascum thapsus</i>
SOLANACEAE (Nightshade Family)	
Jimson Weed	<i>Datura stramonium</i>
Clammy Ground Cherry	<i>Physalis heterophylla</i>
Carolina Horse Nettle	<i>Solanum carolinense</i>
Bitter Nightshade	<i>Solanum dulcamara</i>
Black Nightshade	<i>Solanum nigrum</i>
Buffalo Bur	<i>Solanum rostratum</i>
UMBELLIFERAE (Parsley Family)	
Spotted Water Hemlock	<i>Cicuta maculata</i>
Poison Hemlock	<i>Conium maculatum</i>
Wild Carrot	<i>Daucus carota</i>
Wild Parsnip	<i>Pastinaca sativa</i>
URTICACEAE (Nettle Family)	
Stinging Nettle	<i>Urtica dioica</i>
VERBENACEAE (Vervain Family)	
Prostrate Vervain	<i>Verbena bracteata</i>
Blue Vervain	<i>Verbena hastata</i>
Hoary Vervain	<i>Verbena stricta</i>
White Vervain	<i>Verbena urticifolia</i>
ZYGOPHYLLACEAE (Caltrop Family)	
Puncture Vine	<i>Tribulus terrestris</i>

USING THE KEY

The use of a key, particularly a seed key, requires close and careful observation. The features described have reference to the typical seeds of the species. Because of the variability between the seeds of the same species not all of the characteristics will necessarily be found in each seed and in some cases individual seeds may lack most of the features given. For this reason, an identification should not be made on the basis of one or two seeds. The measurements given for each of the species are approximate and exceptions will occur. When used in the key to differentiate between species, a sufficient difference in size exists to be used as a distinguishing feature. Length of the seed refers to longest part of the seed and width to the widest part. Awns, spines, tufts of hairs, or bristles are not included in the measurements since only a part of these structures may be present.

To successfully use a key, it is necessary to have a working knowledge of the terms used. An attempt has been made in this key to use the more common terms and a glossary is provided in the event difficulties are encountered. Unfortunately the shapes, surfaces, and other characteristics of seeds do not always occur in a manner that can be exactly described by a given term. For example, seeds described as circular in outline may not be in the exact shape of a circle nor may those described as ovate be exactly egg-shaped. The term or terms used, however, more closely describe the shape than any other term.

The characteristics given in the key are based on observations made at magnifications of 10-12X. This should be borne in mind if a different magnification is used. Some species are so similar in appearance that it is necessary to rely on one or two characteristics to differentiate between them. In a few cases, it may not be possible to make a positive identification between species but in those instances little difficulty should be experienced in identifying the genus.

A key consists of a list of characteristics sufficiently different so the unknown seed can be identified by the process of elimination. This is done by a step by step process of selecting one of two contrasting statements which applies to the seed being identified.

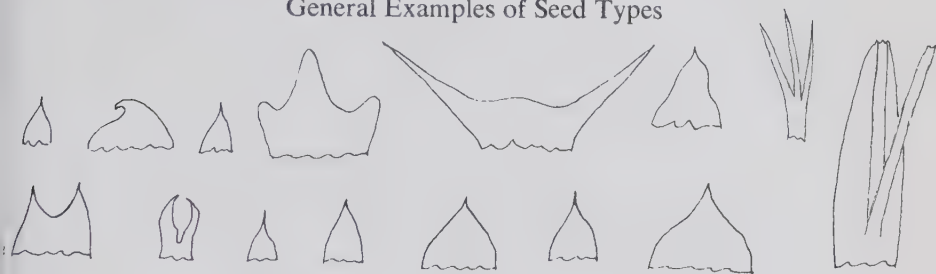
In this key, the seeds are classified into three main groups. A brief examination of the seed sample should, in most cases, readily ascertain whether it belongs to Group I, II, or III. General illustrations are provided to serve as an aid. After this has been accomplished, proceed to read the statement given under each number 1. Select the statement which applies to the seed and proceed to read the statement given under each number 2. Continue this process until the correct species is reached. On occa-

sion, in the various steps, the evidence may be such that it can be interpreted several ways. Where it has been anticipated that this may occur, the species has been entered in two places thus allowing for successful classification by following either of the two tracks. Likewise, the seeds of some species vary considerably in appearance depending upon the type and amount of handling to which they have been subjected. In such cases, multiple entries have also been made. After the classification has been made, refer to the illustration and compare it with the seed sample to verify the accuracy of your identification. If the illustration does not agree with your identification, an error has been made in the process or your interpretation of the evidence may have been different than that which was intended. In this event, go back to the beginning and repeat the step by step process to check for errors. If, after repeating the process, you run into a dead end, it is likely that the species is not included in the key.

Class I

SEEDS WITH APEX TERMINATING IN A SHARP POINT OR POINTS, AWN, HOOK(S), OR SPINE(S), AN AWN ORIGINATING FROM ANY PART OF THE SEED, OR WHICH ARE DISTINCTLY TRIANGULAR IN CROSS SECTION. Page 16.

General Examples of Seed Types



Class II

SEEDS WITH APEX TRUNCATE (PAPPUS NOT TO BE CONSIDERED) OR OBLONG IN OUTLINE. Page 26.

General Examples of Seed Types



Class III

SEEDS WITH APEX NOT TRUNCATE OR WHICH DO NOT TERMINATE IN A SHARP POINT OR POINTS, AWN, HOOK(S), OR SPINE(S) OR WHICH DO NOT HAVE AN AWN ORIGINATING FROM ANY PART OF THE SEED. Page 35.

General Examples of Seed Types



CLASS I

Seeds With Apex Terminating in a Sharp Point or Points, Awn, Hook(s), or Spine(s), an Awn Originating From Any Part of the Seed or Which Are Distinctly Triangular in Cross Section.

1. Entire surface glossy.
2. Surface smooth or essentially so.
3. Triangular in cross section.
 4. 1.5 mm or less in length.
 5. Angles obtuse, deep reddish brown, apex bluntly pointed, parts of calyx usually remain attached, three sides about equal in width. 1.0-1.3 mm long, 0.8-1.1 mm wide. (seed with perianth removed)

Red Sorrel (*Rumex acetosella*) Page 88

4. More than 1.5 mm in length.
 5. Angles generally obtuse or if acute, not prominently winged.
 6. Reddish-brown, narrowly winged; darker colored on the angles, apex sharply tapered to short point, base has short stalk. 2.1-2.6 mm long, 1.4-1.7 mm wide. (About 1.5 times as long wide)

Curly Dock (*Rumex crispus*) Page 122

6. Chocolate brown, frequently not winged or only slightly so; angles not darker colored, apex gradually tapered to short point, base has short stalk. 2.0-2.5 mm long, 1.1-1.5 mm wide. (Less than 1.5 times as long as wide)

Broad Leaf Dock (*Rumex obtusifolius*) Page 122

5. Angles acute, narrowly winged.
 6. Wings prominent, seed broadly ovate, short pointed apex, reddish-brown. 2.0-2.7 mm long, 1.3-1.7 mm wide.

Smooth Dock (*Rumex altissimus*) Page 122

3. Not triangular in cross section.
 4. Flattened; circular to ovate in outline, with stout, pointed tip; remnant of perianth usually attached to the base.
 5. Center of face concave or sunken.
 6. Circular to ovate in outline with short pointed tip; black or reddish-brown. 1.5-2.5 mm long, 1.3-1.8 mm wide.

Pale Smartweed (*Polygonum lapathifolium*) Page 134

5. Center of face not sunken.
6. More than 2.5 mm in length.
7. Circular or almost circular in outline with short, pointed tip; black to reddish-brown. 2.8-3.5 mm long, 2.6-3.0 mm wide.

Pennsylvania Smartweed (*Polygonum pensylvanicum*) Page 134

6. Seeds 2.5 mm or less in length.
7. Circular to ovate in outline with short, pointed tip, black to reddish-brown. 2.0-2.5 mm long, 1.7-2.0 mm wide.

Lady's Thumb (*Polygonum persicaria*) Page 134

4. Plano-convex; elliptical to ovate in outline, elongated.
5. Most seeds 2.0 mm or more in length.
6. Mahogany-colored shading to reddish-brown or yellow; two prominent rachilla segments with expanded tops usually present. 4.3-5.5 mm long, 1.5-2.0 mm wide. (spikelet)

Johnson Grass (*Sorghum halepense*) Page 146

6. Yellowish-green to yellowish-brown; dorsal side with light, longitudinal lines. Very strongly arched in side view, broadest about the middle, apex pointed and frequently flattened. 2.2-3.0 mm long, 1.6-2.2 mm wide. (fertile floret)

Barnyard Grass (*Echinochloa crusgalli*) Page 126

5. Most seeds less than 2.0 mm in length.
6. Greenish-yellow, greenish-black, or brown; dorsal side with light, longitudinal lines, and slightly convex. 1.1-1.6 mm long, 0.5-0.8 mm wide. (fertile floret)

Witch Grass (*Panicum capillare*) Page 130

6. Olive green on the dorsal side, with fine yellowish lines; flattened. 1.1-1.8 mm long, 0.6-0.9 mm wide. (fertile floret)

Fall Panicum (*Panicum dichotomiflorum*) Page 130

2. Surface with fine network of veins or transverse ridges.
3. Triangular in cross section.
4. Surface finely pebbled. Light brown to yellowish-brown; obovate in outline, broadest near the apex and gradually tapered to rounded base. Angles blunt, rounded; sides distinctly concave and in cross section appearing like three-toothed cog. Remnant of style usually attached to the apex. 1.1-1.5 mm long, 0.5-0.7 mm wide.

Yellow Nutsedge (*Cyperus esculentus*) Page 86

3. Oval in cross section.

4. Surface with irregular, transverse ridges which gradually become deeper and wider toward the apex. Oval in cross section, narrowly obovate in outline, broadest near the apex and gradually tapered to rounded base. Hilum oval or circular, depressed, usually with five grooves or lines radiating across the base and a short distance upward on the seed. Some seeds with constricted appearance just above the base. Remnant of beak usually present at apex. Yellowish-brown. 3.0-3.5 mm long, 0.3-1.1 mm wide.

Oxtongue (*Picris echioides*) Page 104

1. Entire surface not glossy.

2. Distinctly triangular in cross section. (All angles definite)

3. Angles smooth and glossy.

4. Reddish-brown to dark brown. Sides roughened by tiny tubercles, usually unequal in width and slightly concave. Broadest about one-third distance from base, gradually tapered to pointed apex and sharply to base. Remnant of perianth usually attached to base. 2.5-3.0 mm long, 1.5-2.0 mm wide.

Prostrate Knotweed (*Polygonum aviculare*) Page 88

4. Dark brown to black. Sides dull, finely roughened; usually unequal in width. Angles blunt, rounded. Roughly oval in outline, tip and occasionally base elongated. Remnant of perianth usually attached to base. 3.0-4.0 mm long, 2.0-2.5 mm wide.

Wild Buckwheat (*Polygonum convolvulus*) Page 122

3. Angles not smooth and glossy.

4. Seed scar prominent, long, narrowly oblong, black, smooth. Surface roughened, reddish-brown with network of tan ridges. Three to five-sided when viewed with seed scar up. 0.9-1.2 mm long, 0.6-0.9 mm. wide.

Scarlet Pimpernel (*Anagallis arvensis*) Page 116

4. Seed scar small, oval or circular. Seed enclosed in a reddish-brown, granular perianth which has a longitudinal vein at least part way up the center of each face and lesser veins branching from it. The three sepals, one over each angle, usually persist. Roughly oval in outline, base slightly extended, apex a blunt point. 1.2-1.5 mm long, 0.9-1.2 mm wide. (Seed with perianth attached)

Red Sorrel (*Rumex acetosella*) Page 88

2. Not distinctly triangular in cross section. (All angles not definite)

3. Margin with a straight or hooklike extension originating to one side and slightly below the extreme apex. Obovate in outline.

4. Less than 2.0 mm in length.

5. Margins winged with one more widely winged than the other. Surface pitted. Small hooklike extension on one side of apex margin. Yellowish-brown. 1.3-1.7 mm long, 1.1-1.3 mm wide.

Small Flower Buttercup (*Ranunculus abortivus*) Page 100

5. Margins usually not winged but occasionally a minute wing may occur on the lesser curved margin. Each face with a raised, granular, irregular border along the margins and a few transverse wrinkles on the central face. Small, usually straight but occasionally slightly curved extension on one side of apex margin. Tan to yellowish-brown. 0.9-1.1 mm long, 0.7-0.9 mm wide.

Celery Leaf Buttercup (*Ranunculus sceleratus*) Page 100

4. More than 2.0 mm in length.

5. Light brown to dark brown. Surface finely pitted. Prominent hook on one side of apex margin. Margins winged with one more prominently winged than the other. 2.2-3.3 mm long, 2.0-2.6 mm wide.

Tall Buttercup (*Ranunculus acris*) Page 100

5. Dark brown to reddish-brown center with prominent, yellowish, winged margins and a fine ridge separating the two. Surface granular. Prominent hook on one side of apex margin. 3.0-3.5 mm long, 2.3-2.8 mm wide.

Bulbous Buttercup (*Ranunculus bulbosus*) Page 100

3. Margin without straight or hooklike extension originating to one side and slightly below the extreme apex.

4. Surface with tubercled or spiny longitudinal ribs or nerves.

5. 4.5 mm or more in length.

6. Surface with 15 longitudinal ribs covered with warty protuberances and becoming spiny near the apex. Apex terminates in long, roughened awn. About circular in cross section. Brown to reddish-brown. Seed scar depressed, oblique. 4.5-5.5 mm long, 0.5-0.7 mm wide.

Spotted Cat's Ear (*Hypochoeris radicata*) Page 66

6. Surface with 5 prominent ribs covered with stout spines and a lesser rib in each interspace. Apex terminates in long, roughened awn. Five-sided in cross section. Yellowish to greyish-brown. Seed scar depressed, oblique, with slender stalk in the center. 10.0-13.0 mm long, 1.3-1.8 mm wide.

Meadow Salsify (*Tragopogon pratensis*) Page 104

5. Less than 4.5 mm in length.

6. Plano-convex (one side convex, the other flattened or slightly concave).

7. Four prominent ribs bearing spines about 1 mm long on convex side. Lesser rib in each interspace. Flattened side with slight, spineless rib extending into a beak or head. Ovate or oval. Greyish-yellow to yellow. 2.5-3.4 mm long, 1.3-2.0 mm wide.

Wild Carrot (*Daucus carota*) Page 66

7. Second glume (convex side) sharply pointed, with a central nerve and two closely spaced nerves near each margin, nerves spined at least in the upper half. Inter-nerve spaces hairy. Sterile lemma (flattened side) with two or three spined nerves, sharply pointed or with prominent awn. First glume (flattened side) wrapped around base, apex pointed, about one-third length of spikelet. Strongly arched in side view. 3.0-3.5 mm long, 1.8-2.4 mm wide. (spikelet)

Barnyard Grass (*Echinochloa crusgalli*) Page 126

6. Not plano-convex in cross section.

7. Seeds flattened.

8. Ribs minutely barbed becoming sparsely covered with longer, fine bristles near the apex. Greyish-yellow to yellowish-brown. 3.0-4.0 mm long, 1.1-1.5 mm wide.

Prickly Lettuce (*Lactuca scariola*) Page 126

8. Ribs covered with short protuberances in the lower part but with long, stout, stiff spines in the upper one-third. Yellowish or golden-brown. 3.0-4.0 mm long, 1.1-1.3 mm wide.

Dandelion (*Taraxacum officinale*) Page 88

4. Surface without tubercled or spiny longitudinal ribs.

5. Seeds with a tiny point at both ends.

6. Seeds very small, 0.6-0.9 mm long, 0.4-0.9 mm wide. Surface may appear granular or with very fine ridges in a checkerboard pattern. Hilum oval, oblique, with central ridge, relatively large for seed size. Oval in cross section. Reddish-brown or orange-red. (caryopsis)

Stinkgrass (*Eragrostis cilianensis*) Page 130

5. Seeds without a tiny point at both ends.

6. Surface with transverse ribs or ridges.

7. Broadly oval or obovate. Each face with prominent midrib extending into awnlike projection at the apex and numerous irregular, transverse ridges. Highly flattened. Black. 4.0-5.0 mm long, 2.0-2.5 mm wide.

Tall Lettuce (*Lactuca canadensis*) Page 118

6. Surface without transverse ribs or ridges.

7. Apex or crown terminating in two or more awns, spines, or points.

8. Apex terminating in a strong central prouberance and surrounded by a circle of lesser protuberances (usually five or more) which originate at the crown.

9. Protuberances blunt, each continuing downward as a broad, rounded rib. Urn-shaped. Greyish-brown, yellowish-brown, to brown. 6.0-12.0 mm long, 4.0-6.0 mm wide.

Giant Ragweed (*Ambrosia trifida*) Page 82

9. Protuberances quite sharp, each continuing downward as a weak rib. Urn-shaped. Greyish-brown to reddish-brown. 3.0-4.0 mm long, 1.8-2.5 mm wide.

Common Ragweed (*Ambrosia artemisiifolia*) Page 82

8. Apex not terminating in a strong central protuberance and without a circle of lesser protuberances.
9. Apex terminating into 3 or 4 stiff, downwardly barbed spines. Long, narrow, angular, widest near the middle and gently tapering to both ends. Light brown to black. 8.5-11.5 mm long, 0.5-1.1 mm wide.

Spanish Needles (*Bidens bipinnata*) Page 64

9. Apex terminating in two spines or points.
10. Triangular in outline.
11. Single, sharp bony spine originates from each of two corners. Upraised area between two spines bears one or two fine spines. (Five attached seeds (burs) form a pod but separate at maturity.) Surface velvety, yellowish-brown to brown. 4.0-4.5 mm long, and about same width.

Puncture Vine (*Tribulus terrestris*) Page 146

10. Not triangular in outline.
11. Highly flattened, broad.
12. Greyish-brown, broadest nearest the apex and tapered to a rounded base which usually has a fine, short point. Margins smooth and winged. Apex notched and with two short teeth, one on each side of the notch. Surface covered with short, fine, whitish hairs and longitudinal ribs. 8.0-13.0 mm long, 4.0-7.0 mm wide.

Prairie Dock (*Silphium terebinthinaceum*) Page 80

12. Light brown to brown, broadest near the apex with each margin slightly tapered to the base. Margins usually serrated with each side margin extending into two downwardly barbed awns. Surface covered with warty tubercles and main central rib running from apex to base. 6.0-11.0 mm long, 3.0-4.0 mm wide.

Devil's Beggarticks (*Bidens frondosa*) Page 66

11. Not highly flattened.
12. Three-sided in cross section, dorsal side convex, ventral side two-faced. Apex terminates in two, broad, flattened spine-like projections which bear short spines on their inner margin. Surface covered with network of veins, but angle of ventral side is smooth. Brown to reddish-brown. 1.8-2.2 mm long, 1.3-1.7 mm wide.

Prickly Sida (*Sida spinosa*) Page 132

7. Apex not terminating in two or more awns, spines or points.
8. Apex terminating in an awn or long, slender projection, or with awn originating from the back of the lemma.
9. Surface completely or partially covered with hairs or with tuft of hairs at the base.
10. 6.0 mm or more in length.
11. Base with tuft of hairs.
12. Narrowly elliptical. Rachilla 3.0-4.0 mm, densely covered with ascending hairs. Long, black twisted awn originates about midway of dorsal side, lies in rounded furrow, sharply bent above the apex. Seed scar oval, oblique, sunken, with raised collar. Brownish, grey, black, or yellow. 11.0-14.0 mm long, 2.0-2.5 mm wide.

Wild Oat (*Avena fatua*) Page 128

12. Dagger-shaped, tapered to sharp point at the the base. Rachilla not visible. Apex terminating in twisted awn 3-5 inches long. Lemma covered with short hairs, strongly inrolled leaving only narrow strip of palea visible. Light brown. 6.0-12.0 mm long, 0.6-0.7 mm wide.

Porcupine Grass (*Stipa spartea*) Page 128

11. Base without tuft of hairs.
12. Lanceolate, tapering to both ends. Rachilla flattened on back, convex in front, and bulged at the top. Lemma hairy, inrolled, tip transparent and split at the apex, strongly nerved with middle nerve extending into an awn equal to or longer than the lemma. Palea about same length as lemma, well exposed, concave, keel covered with long hairs between which are shorter hairs. Greyish-yellow to purplish. 8.0-12.0 mm long, 0.9 to 1.1 mm wide.

Downy Brome grass (*Bromus tectorum*) Page 128

10. Less than 6.0 mm in length.
11. Cone-shaped. Apex terminates in oblique, oval cavity with flanged rim from which arises a long, twisted awn that terminates in a prominent, "corkscrew" hook. Base sharply tipped and with tuft of hairs. Surface covered with ascending hairs. Orange-brown to reddish-brown. 3.0-4.2 mm long, 0.7-0.9 mm wide.

Red Stem Filaree (*Erodium cicutarium*) Page 64

11. Narrowly elliptical. Tipped with minutely barbed, straight awn as long or longer than the seed. Lemma dull, three-nerved, sparsely covered with short, stiff hairs. Palea convex with short, stiff hairs on keel nerves. Base sparsely covered with long, white hairs. Yellowish or silvery. 1.8-2.2 mm long, 0.4-0.6 mm wide.

Nimblewill (*Muhlenbergia schreberi*) Page 130

9. Surface not hairy and without tuft of hairs at base.

10. Less than 4.0 mm in length.

11. Caryopsis broadly ovate; plano-convex. Flattened side slightly wrinkled; convex side smooth. Apex with short, needlelike appendage. Scutellum circular, black, usually with white tipped stalk remnant. Tan or light brown. 2.6-3.5 mm long, 2.0-3.0 mm wide.

Field Sandbur (*Cenchrus pauciflorus*) Page 146

10. More than 4.0 mm in length.

11. Palea flat, rachilla about two-thirds to three-fourths the length of palea.
12. Elliptical, sessile, widest at the middle or slightly below. Palea almost completely exposed, with a prominent wrinkle. (Seed unit may occur as a group of three spikelets, the central one fertile and the other two sterile. Sterile spikelets consist of an unexpanded lemma and long, flexible glumes.) Yellow. 5.0-7.5 mm long, 1.0-1.5 mm wide.

Foxtail Barley (*Hordeum jubatum*) Page 132

11. Palea concave, rachilla less than two-thirds the length of the palea.
12. Widest above the middle, rachilla about one-fifth to one-sixth the length of the lemma.
13. Lemma about same length as palea, nerved, inrolled particularly in the lower one-half. Palea margins sparsely covered with spiny hairs. Awn arises from middle nerve slightly below apex. Back of rachilla flat, front convex and bulged near top. Yellow to grey. 6.5-8.0 mm long, 1.5-2.0 mm wide.

Cheat (*Bromus secalinus*) Page 132

12. Widest at about or below the middle.

13. Lance-shaped, palea concave, sinus U shaped. Lemma convex, smooth, semi-glazed, tipped with awn about one-third to one-half the length of the seed. Palea concave, notched at the tip, folded in lower one-half, keel bears short hairs with broad base. Rachilla exposed, about one-sixth to one-fifth the length of the seed. Straw-colored but sometimes with greenish tinge. 8.0-9.0 mm long, 1.3-1.8 mm wide.

Quack Grass (*Agropyron repens*) Page 128

8. Apex not terminating in an awn or long slender projection and without awn originating from back of lemma.

9. Less than 2.0 mm in length.

10. Ovate with slightly extended, truncate base, broadly pointed apex usually tipped with short, dark stalk. Lens-shaped in cross section, surface dull, slightly roughened. Greyish to yellowish-tan. 0.9-1.2 mm long, 0.7-0.9 mm wide.

Stinging Nettle (*Urtica dioica*) Page 90

9. 2.0 mm or more in length.

10. Seed unit a spikelet.

11. Margins of second glume and sterile lemma covered with hairs.

12. First glume narrower than the base, very short. Second glume narrow, about one-half length of the spikelet, hairy on the margins. Sterile lemma prominently nerved, margins covered with ascending hairs. Sterile lemma, glumes, and fertile lemma tan. 2.5-3.5 mm long, 0.9-1.1 mm wide. (spikelet)

Large Crabgrass (*Digitaria sanguinalis*) Page 132

11. Margins of second glume and sterile lemma glabrous.

12. First glume wrapped around base of spikelet, one-third to one-half the length of the spikelet, its apex pointed. Spikelet sharply tapered to long, pointed tip. Second glume and sterile lemma prominently nerved and frequently spread apart at the tip. Strongly arched in side view. Straw-colored. 2.0-2.7 mm long, 0.6-0.9 mm wide. (spikelet)

Witch Grass (*Panicum capillare*) Page 130

12. First glume (flattened side) wrapped around base of spikelet, one-fifth to one-fourth the length of the spikelet, its apex rounded. Spikelet gradually tapered to pointed apex. Second glume (convex side) and sterile lemma (flattened side) prominently nerved. Not strongly arched in side view, at least less so than Witch Grass. Straw-colored. 2.0-3.0 mm long, 0.8-1.1 mm wide. (spikelet)

Fall Panicum (*Panicum dichotomiflorum*) Page 130

10. Seed unit not a spikelet.

11. Plano-convex.

12. Ovate in outline. Dorsal and ventral sides with sparse, fine longitudinal ridges and broad transverse wrinkles. Broadest below the middle, gradually tapered to apex which terminates in short, pointed tip. Seed frequently curved toward flattened side. Dark brown to black. 12.0-14.0 mm long, 4.5-5.0 mm wide.

Cocklebur (*Xanthium pensylvanicum*) Page 118

11. Not plano-convex.

12. Shaped like a hood or "night cap with erect point"; tubercled, base broadly truncate. Widest near the middle, gradually tapered to wide, oval, truncate base, sharply and concavely tapered to pointed apex. Base has two short protuberances and rimmed collar. Dorsal side with central ridge, surface covered with warty tubercles. Greyish-brown to brown. 2.6-3.7 mm long, 1.7-2.6 mm wide.

Corn Gromwell (*Lithospermum arvense*) Page 106

12. Ovate, not tubercled, without truncate base.

13. Apex sharply tapered to short point, base with short stalk. Some seeds three-sided, others elliptical but with one side more highly arched than the other. Surface dull, finely granular. Remnant of perianth, whose surface has resinous dots, frequently present at base. 2.2-3.0 mm long, 1.5-1.9 mm wide.

Common Smartweed (*Polygonum hydropiper*) Page 134

CLASS II

Seeds With Truncate Apex or Oblong in Outline.

1. Surface partially or completely covered with hairs.
2. Surface with prominent, broad ribs.
3. Each face usually with one rib on each corner and one in the center. Surface with short, fine hairs which lie close to the surface. Square in cross section; oblong except tapered at the base. Hilum oval, depressed. Apex depressed with raised area in the center from which fine ridges radiate to the margins. Greyish-brown. 3.0-4.0 mm long, 0.9-1.2 mm wide.

Teasel (*Dipsacus sylvestris*) Page 80

2. Surface without longitudinal ribs.
3. Broadly obovate; plano-convex.
4. Apex bears a blunt calyx remnant or sometimes a few calyx teeth. Dorsal side convex with few faint ribs, sparsely covered with hairs which become much longer toward the apex. Ventral side flat with raw, damaged appearance and a forked groove. Light brown to greyish-brown. 3.0-4.2 mm long, 2.3-2.9 mm wide.

Poor Joe (*Dioda teres*) Page 92

3. Peg shaped; rectangular, square, or rhombic in cross section.
4. Apex with pappus of 5 or 6 broadly ovate, awned scales.
5. Seed practically obscured by long appressed hairs originating at the base and as long or longer than the seed. Base truncate, seed scar oval. Reddish-brown. 1.0-1.5 mm long, 0.6-0.9 mm wide.

Bitter Sneezeweed (*Helenium tenuifolium*) Page 116

4. Apex with pappus of numerous bristles or narrow scales.
5. Apex bears pappus of narrow scales almost as long as the seed. Surface densely covered with short, whitish, upraised hairs. Two types of seed: disk seeds which are straight, square in cross section, and with well-developed pappus; ray seed is slightly curved, rhombic in cross section and its pappus not as well developed. If pappus is absent, a white, conspicuous collar is still evident. Brownish-black. 1.1-1.6 mm long, 0.6-0.7 mm wide.

Small Flower Galinsoga (*Galinsoga parviflora*) Page 116

1. Surface glabrous (not hairy).
2. Surface with definite longitudinal ribs or combination of longitudinal and transverse ribs.
3. Surface with longitudinal and transverse ribs, at least in part of the seed.
4. Oblong, sector-shaped in cross section, dorsal face convex and with narrow ribs. Ventral side granular, two-sided forming a longitudinal ridge; margins winged, seed scar oval, white, oblique.
5. Dorsal side with three to five prominent, narrow, longitudinal ribs and also with prominent transverse ribs in the upper one-fourth to one-half of the seed. Most seeds longer than 2.0 mm.
6. Dorsal side usually with five longitudinal ribs and occasionally four which run part way or the entire length of the seed and are joined by transverse ribs in the upper one-half of the seed. Usually flared or wider at the base. Golden brown to reddish-brown. 2.0-2.4 mm long, 0.7-0.9 mm wide.

Prostrate Vervain (*Verbena bracteata*) Page 96

6. Dorsal side usually with five and occasionally six longitudinal ribs which run part way or the entire length of the seed and are joined by transverse ribs in the upper one-fourth of the seed. Usually about the same width throughout. Reddish-brown. 2.4-3.1 mm long, 0.6-0.8 mm wide.

Hoary Vervain (*Verbena stricta*) Page 96

5. Dorsal side with three to five weak, sometimes incomplete longitudinal ribs and sparse, weak transverse ribs in the upper one-fourth to one-third of the seed. Most seeds 2.0 mm or less in length.
6. Dorsal side usually with three and occasionally five fine, weak longitudinal ribs which are joined by sparse, weak transverse ribs which frequently occur only between the margin and first rib in the upper one-third of the seed. Brown to reddish-brown. 1.5-1.8 mm long, 0.5-0.6 mm wide.

White Vervain (*Verbena urticifolia*) Page 96

6. Dorsal side usually with three to five weak but rather broad based longitudinal ribs which are joined by sparse, weak transverse ribs and frequently occur only between the margin and the first rib in the upper one-fourth to one-third of the seed. Dark reddish-brown to almost black. 1.7-2.0 mm long, 0.7-0.9 mm wide.

Blue Vervain (*Verbena hastata*) Page 96

4. Trapezoidal, widest at apex and gradually tapered to slightly rounded base.
5. Surface highly roughened by deep, longitudinal ribs; very short remnant of seed stalk usually attached to base. Light brown and darker brown near the hilum or entire seed dark brown. 0.6-0.9 mm long, 0.4-0.5 mm wide.

Common Mullein (*Verbascum thapsus*) Page 102

5. Surface highly roughened by deep, longitudinal grooves and vertical rows of deep, elliptical pits. Very short remnant of seed stalk usually attached to base. Brown to black. 0.6-0.9 mm long, 0.4-0.5 mm wide.

Moth Mullein (*Verbascum blattaria*) Page 102

3. Surface with longitudinal ribs but without cross ribs.
4. Ribs cross-grooved, tubercled, or sparsely covered with spines.
5. Ribs cross-grooved.
 6. All ribs prominent, not roughened or cross-grooved between ribs. Narrowly elliptical, frequently slightly curved, widest at or above the middle. Truncate base and apex each with rimmed collar. Parachute of fine hairs usually removed from apex in handling. Flattened, narrowly elliptical in cross section. Dark brown to reddish-brown. 2.4-3.0 mm long, 0.7-1.1 mm wide.

Perennial Sow Thistle (*Sonchus arvensis*) Page 126

6. Some ribs considerably more prominent than others, roughened or cross-grooved between ribs. Spindle or club-shaped, one margin usually more curved than the other. Truncate base and apex each with a rimmed collar. Parachute of fine hairs usually removed from apex in handling. Oval to narrowly elliptical in cross section. Brown to reddish-brown. 2.6-3.3 mm long, 0.7-1.1 mm wide.

Annual Sow Thistle (*Sonchus oleraceus*) Page 126

5. Ribs tubercled or sparsely covered with weak spines.
6. Ribs tubercled.
 7. Roughened by ten longitudinal ribs covered with wartlike tubercles or protuberances. Tapered from apex to base, sometimes slightly curved. Apex with short, stout protuberance; seed scar surrounded by collar and light colored remnant of seed stalk frequently attached. Circular in cross section. Yellowish-brown to greyish-brown. 1.3-1.8 mm long, 0.7-1.0 mm wide.

Mayweed (*Anthemis cotula*) Page 112

6. Ribs sparsely covered with weak spines.

7. Elongated; widest above the middle, slightly tapered to apex with a parachute of unbranched bristles about twice the length of the seed and located within a row of narrow scales. Bristles may be lacking but scales usually remain. Tapered to base with round, smooth, buttonlike seed scar. Inter-rib spaces covered with tubercles. Yellowish-brown to brown. 2.4-3.0 mm long, 0.7-0.8 mm wide.

Tall Ironweed (*Vernonia altissima*) Page 106

4. Ribs not cross-grooved, tubercled or covered with spines.

5. Multi-colored (two or more colors).

6. Ribs of different color than interspaces.

7. Ovate in outline with slightly extended, flared apex; plano-convex. Dorsal side with five broad, yellowish-brown, longitudinal ribs and reddish-brown, granular interspaces. Flattened side has dark colored, oval-shaped center which is divided by a thin, light colored, longitudinal strip and surrounded by a lighter colored area. 2.4-3.3 mm long, 1.5-2.2 mm wide.

Spotted Water Hemlock (*Cicuta maculata*) Page 64

7. Ribs yellowish-white to silvery with inter-rib spaces a reddish-black and frequently covered with white spots or yellowish coloring. Narrowly obovate; one margin straight, the other curved. Short, blunt style remnant at the apex. Circular to oval in cross section. 1.5-2.0 mm long, 0.6-0.9 mm wide.

Oxeye Daisy (*Chrysanthemum leucanthemum*) Page 86

6. Ribs not of a different color than the interspaces.

7. Greyish or light brown with black mottling in mature seeds. Widest above the middle, frequently near the apex; gradually tapered toward the base, sometimes curved. Oval to three or five-sided. 2.2-3.0 mm long, 0.9-1.5 mm wide.

Chicory (*Cichorium intybus*) Page 86

5. Not multi-colored.

6. Length 4.5 mm or more.

7. Highly elongated, narrow, flattened. Broadest at or near the middle, slightly tapered to a truncate, wavy apex and to a narrow, thin base. Generally elliptical in cross section. One face usually has a narrow, white, longitudinal line running through the middle one-third of the seed and the other is sometimes longitudinally ridged. Brown to mahogany-red. 4.5-6.0 mm long, 0.8-1.0 mm wide.

Dogbane (*Apocynum cannabinum*) Page 86

6. Length of seed less than 4.5 mm.

7. Surface with broad, longitudinal ribs.

8. Each face usually with three ribs. Square in cross section; oblong but tapered at base. Hilum oval, depressed. Apex depressed with raised central area from which fine ridges radiate to the margins. Greyish-brown. 3.0-4.0 mm long, 0.9-1.2 mm wide.

Teasel (*Dipsacus sylvestris*) Page 80

8. Ribs broad, inter-rib space only a crease, some seeds strongly flared at the apex. Seeds of two types — ray seed and disk seed. Both types cone-shaped, broadest at the apex; short blunt remnant attached to center of a deep apex depression; circular in cross section. Ray seed flared at the apex, usually slightly curved. Disk seed not flared, usually straight. Yellowish-brown to reddish-brown. Ray seed 2.2-2.5 mm long, 1.0-1.3 mm wide. Disk seed 1.8-2.0 mm long, 0.7-0.9 mm wide.

Corn Chamomile (*Anthemis arvensis*) Page 110

7. Surface with narrow, longitudinal ribs.

8. Base truncate.

9. Ribs narrow; inter-rib space wide, surface granular; apex collar slightly toothed, slightly expanded, but not flared. Broadest near the apex, gradually tapered to truncate base which has a narrow, but prominent rim. Straw-colored to greyish-brown. 1.3-1.7 mm long, 0.5-0.7 mm wide.

Tansy (*Tanacetum vulgare*) Page 114

9. Ribs faint, scattered; surface dull or with slight sheen. Apex margin smooth and usually with stout style remnant in the center. Broadest above the middle and tapered in a convex fashion to a narrow, truncate base. Whitish to yellowish. 2.5-3.5 mm long, 1.3-2.2 mm wide.

Russian Knapweed (*Centaurea repens*) Page 108

8. Base not truncate.

9. Four-sided, corners sharply angular. Remnant of style usually in middle of apex. Widest at or near the apex, and gradually tapered to bluntly rounded base, sometimes slightly curved. Fine, longitudinal ribs. Dark brown to black. 1.5-2.2 mm long, 0.4-0.6 mm wide.

Blackeyed Susan (*Rudbeckia serotina*) Page 116

9. Usually cylindrical, but sometimes four-sided. Short pappus usually attached to periphery of the apex or if absent a light colored ring or collar remains. Some seeds may taper slightly from apex to base but the sides of many if not most run about parallel from apex to near the base at which point they sharply taper to the base. Ribs narrow. Seed scar light colored. Dark brown to black. 1.8-2.2 mm long, 0.3-0.4 mm wide.

Orange Hawkweed (*Hieracium aurantiacum*) Page 112

2. Surface with neither definite longitudinal ribs or combination of longitudinal and cross ribs.
3. Highly flattened, center slightly convex, with wide, thin winged margins.
4. More than 5.0 mm in length.
5. Central longitudinal nerve on one face starts at the apex and runs downward for about three-fourths the length of the seed. Apex widely truncate, usually straight, and its width about one-half the widest part of the seed. Surface wrinkled, margins tan or light brown with central portion a darker color, frequently a reddish-brown. 8.0-10.0 mm long, 4.4-5.5 mm wide.

Common Milkweed (*Asclepias syriaca*) Page 80

5. Central longitudinal nerve on one face runs from the apex into a dark reddish-brown, club shaped, depressed area which extends about three-fourths the length of the seed. Apex usually slightly concave, its width about one-fifth to one-fourth the widest part of the seed. Margins wrinkled and separated on one side from the central granular or finely wrinkled portion by a deep furrow. Margins and central portion reddish-brown in color. 5.0 to 5.5 mm long, 3.0 to 3.5 mm wide.

Eastern Whorled Milkweed (*Asclepias verticillata*) Page 80

4. Less than 5.0 mm in length.
5. Seeds papery thin with a membranous covering. Winged margins silvery or tan; reddish or purplish center visible through covering. Apex frequently concavely truncate with blunt, style remnant in center. Elongated, broadest at apex and gradually tapered to narrow, truncate base. In edge view, slightly curved. 1.7-2.5 mm long, 0.7-0.9 mm wide.

Common Yarrow (*Achillea millefolium*) Page 74

3. Not highly flattened and without wide, thin, winged margins.
4. Triangular or sector-shaped in cross section or with seed scar notched in the margin immediately above the base.
5. Sector-shaped in cross section.
6. Seed scar triangular, slightly depressed. Apex slightly oblique with wavy or toothed collar and bearing a tuft of short hairs. Broadest near the apex and gradually tapered to oblique, truncate base. Surface roughened and with "varnished" appearance. Dark brown to reddish-brown. 1.7-2.0 mm long, 1.1-1.3 mm wide.

Motherwort (*Leonurus cardiaca*) Page 158

6. Seed scar prominent, its long axis running across the seed, curved, usually constricted in the middle giving it a "dumb-bell" shaped appearance; and with a central furrow. Obovate in outline; apex wavy and sometimes with one or two short teeth. Viewed from ventral side a triangular-shaped area of roughened, "raw tissue" can be seen. Surface granular. Dark brown. 2.1-3.0 mm long, 1.2-1.8 mm wide.

Dragonhead Mint (*Dracocephalum parviflorum*) Page 136

5. Seed scar notched in the margin immediately above the base.
6. Apex bears two rows of bristles, the outer row 1.3-2.0 mm long and the inner row much shorter. Apex collar finely serrated, base rounded. Widest near the apex. Olive-green to black with four prominent, yellow, longitudinal lines and lesser lines between. Dull or with slight sheen. Area adjacent to seed scar usually yellow. 2.5-3.0 mm long, 1.1-1.5 mm wide.

Spotted Knapweed (*Centaurea maculosa*) Page 108

4. Not triangular or sector-shaped in cross section or with seed scar notched in the margin of the seed.
5. Mottled or with zig-zag color pattern, or streaked with dark brown, purple, or black.
6. Mottled or with zig-zag color pattern.
7. Apex wavy and with blunt teeth. Dull, wrinkled, sometimes with indefinite, slight, longitudinal ribs or grooves. Broadest near the apex and apex with short, slender inconspicuous style remnant in the center. Flattened, three to five-sided. Frequently curved; truncate base. Brown with black mottling or zig-zag pattern. 4.5-6.0 mm long, 2.3-2.7 mm wide.

Common Burdock (*Arctium minus*) Page 108

6. Streaked with dark brown, purple, or black.
7. Rim of apex slightly crinkled and serrated.
8. Apex oblique, depressed, with stout, conical style remnant in center. Olive-green and streaked with dark brown or black and with broad, yellow band at the apex. Broadest above the middle and tapered to broad, truncate base. 3.0-4.0 mm long, 1.5-2.0 mm wide.

Flodman Thistle (*Cirsium flodmani*) Page 84

7. Rim of apex not crinkled or serrated.
8. Style remnant frequently slender. Apex oblique, depressed. Yellowish-brown and streaked with black or purple and with narrow, yellow band encircling the apex. Broadest near the apex and gradually tapered to narrow, rounded base. 3.5-4.0 mm long, 1.2-1.7 mm wide.

Bull Thistle (*Cirsium vulgare*) Page 84

8. Style remnant stout, conical, and may be capped. Apex oblique, depressed. Yellowish-brown and faintly streaked with dark brown or purple. Prominent yellow band encircles apex. Broadest near the apex and gradually tapered to narrow, rounded base. 4.0-5.0 mm long, 1.7-2.2 mm wide.

Tall Thistle (*Cirsium altissimum*) Page 84

5. Not mottled or streaked with brown, purple, or black.
6. Dark colored — dark brown, reddish-brown, greyish-black, or black.
7. Apex with short tooth at each corner, base oblique, appears as if one-half of a side is notched out.
8. Four-sided, angles raised, sides depressed. Dull, slightly roughened by occasional grooves. Broadest near the apex, gradually tapered to base. Greyish-black to black. 4.0-5.0 mm long, 1.1-1.3 mm wide.

Tall Cone Flower (*Rudbeckia laciniata*) Page 120

7. Apex not toothed, base without a notched-out appearance.
8. Margins winged, shape highly variable including trapezoids, parallelograms, rectangles, and crescents.
9. Surface wrinkled giving granular or sometimes irregularly ribbed appearance. Reddish-brown. 1.5-1.7 mm long, 0.9-1.3 mm wide.

Common Evening Primrose (*Oenothera biennis*) Page 148

8. Margins not winged, shape not highly variable.
9. More than 4.0 mm in length.
10. Highly elongated, narrow, flattened. Broadest at or near the middle, slightly tapered to a truncate, wavy apex and to a narrow, thin base. Usually elliptical in cross section. Surface granular; one face usually has a narrow, white, longitudinal line running through the middle one-third of the seed and the other is sometimes longitudinally ridged. Brown to mahogany-red. 4.5-6.0 mm long, 0.8-1.0 mm wide.

Dogbane (*Apocynum cannabinum*) Page 86

9. Less than 4.0 mm in length.
10. Four-angled, angles sharply raised, sides depressed. Broadest near apex and gradually tapered to narrow, usually pointed base. Apex with pappus of bristles which if removed a narrow, white rim remains. Dull. Black. 1.5-2.4 mm long, 0.3-0.6 mm wide.

Thoroughwort (*Eupatorium serotinum*) Page 112

10. Oval in cross section sometimes becoming four-angled near the base. Broadest near the oblique apex and gradually tapered to truncate, frequently oblique base. Apex with narrow but prominently rimmed collar below which is a constricted band and bearing a slender style remnant. Dull. Brown. 2.5-3.0 mm long, 0.8-1.0 mm wide.

Canada Thistle (*Cirsium arvense*) Page 84

6. Light colored — whitish, light yellow, tan or greyish-brown.
7. Apex with wavy margin and short, slender style remnant. Broadest above the middle and gradually tapered to narrow, rounded base. Some seeds straight, others curved, but some short, broad, and about the same width throughout. Flattened but usually four-angled in cross section. Some seeds smooth, others with some longitudinal ribs. Tan to greyish-brown. 2.5-4.7 mm long, 1.0-1.7 mm wide.

Gumweed (*Grindelia squarrosa*) Page 112

7. Apex margin even and with short, stout style remnant. Broadest above the middle and with both sides tapered evenly in a convex fashion to a narrow, truncate base. Oval in cross section. Dull or slightly glossy with scattered, faint, longitudinal grooves; whitish to yellowish. 2.5-3.5 mm long, 1.3-2.2 mm wide.

Russian Knapweed (*Centaurea repens*) Page 108

CLASS III

Seeds With Apex Not Truncate or Which Do Not Terminate in a Sharp Point or Points, Awn, Hook(s), or Spine(s) or Which Do Not Have an Awn Originating From Any Part of the Seed.

1. Surface covered with tubercles or wartlike protuberances, but without spines or hairs.
2. Kidney-shaped.
3. Surface densely covered with tubercles.
4. Less than 1.0 mm in length.
5. Tubercles frequently pointed but sometimes blunt, borne on grey, rounded plates; usually in definite rows on back and margins but not on the sides of the seed; in rows immediately above and below seed scar cavity. Seed scar cavity narrowly elliptical or only a small oval depression which is flanked on each side by a small, distinct band of narrow plates. Margins rounded, obovate in cross section. Lead-grey. 0.5-0.7 mm long, 0.4-0.5 mm wide.

Sleepy Catchfly (*Silene anthirrhina*) Page 68

4. More than 1.0 mm in length.
5. Black.
6. Tubercles blunt, wide, very short; not borne on plates; not arranged in definite rows on the margin and the sides. Hilum located in deep, narrow notch in the seed; margins rounded, obovate in cross section. Shallow indentation present on sides (faces) near the hilum. Surface has "varnished" appearance. 1.5-2.2 mm long, 1.1-1.5 mm wide.

Bouncing Bet (*Saponaria officinalis*) Page 70

5. Not black.
6. Seed scar about one-half to two-thirds surrounded by a short, but prominent collar.
7. Tubercles short, blunt, borne on oblong plates, in definite rows on back and frequently on the margins but not on the faces. Seed scar cavity oval. Margins rounded, obovate in cross section. Greyish-brown to bluish-grey. 1.3-1.5 mm long, 0.9-1.3 mm wide.

White Cockle (*Lychnis alba*) Page 68

6. Seed scar not surrounded by a collar.
7. Tubercles arranged in definite rows, usually in three to five concentric rows on the sides.
8. Tubercles pointed, borne on oblong, greyish plates in three or more frequently four rows on each side. Tubercles in rows immediately adjacent to one end of the seed scar but usually not in rows immediately next to the other end. Scar cavity flanked on each side with promi-

nent, raised pad of long, very narrow plates. Two ends of the seed about same shape and size. Back of the seed convex. Grey to greyish-black, frequently darker near the hilum. 1.0-1.7 mm long, 0.9-1.1 mm wide.

Bladder Campion (*Silene cucubalus*) Page 68

8. Tubercles blunt, borne on oblong, greyish plates in four or five rows on each side. Tubercles not in rows above and below the seed scar. Seed scar cavity flanked on each side by a narrow, raised pad of elongated plates. In side view one end of seed frequently narrower than the other appearing more ear-shaped than kidney-shaped; convex margins are obtusely angled and in end view the seed appears four-sided. Back of the seed almost flat or sometimes concave in the center. Grey to greyish-brown. 1.3-2.0 mm long, 0.9-1.1 mm wide.

Hairy Catchfly (*Silene dichotoma*) Page 70

7. Tubercles not arranged in definite rows on the sides of the seeds, not prominent.
8. Tubercles blunt, short, borne on roundish, grey plates which become oblong near the seed scar, crowded, seven or eight rows on the back. Two upraised, narrow bands of elongated plates, one on each side of the scar cavity. Obovate in cross section. Light grey to greyish-brown. Tubercles in rows above and below seed scar. 1.0-1.5 mm long, 0.9-1.1 mm wide.

Night Flowering Catchfly (*Silene noctiflora*) Page 68

3. Surface sparsely covered with tubercles.
4. Tubercles whitish, funguslike. Thickest along outer margin, one lobe more pointed than the other. Seed stalk remnant runs from hilum along inner edge of thinner lobe forming a rounded ridge. Each face usually with small concave area; surface granular. 2.0-2.5 mm long, 1.6-2.0 mm wide.

Venice Mallow (*Hibiscus trionum*) Page 136

2. Not kidney-shaped.
3. Globular.
4. Tubercles very short, oval, appearing like pimples, and not in any definite pattern. Broad, shallow depressions frequently present near the hilum. Hilum depressed, circular to oval, white. Dull, black to bluish-black. 2.0-2.7 mm in diameter.

Cow Cockle (*Saponaria vaccaria*) Page 70

3. Not globular.
4. 3.0 mm or more in length.
5. Sector-shaped in cross section, thick.
6. Seed scar kidney or oval-shaped.
7. Seed scar kidney-shaped, in oblique position, yellowish to reddish-brown, large, depressed. Dorsal side strongly convex, each face of ventral side with broad, concave area and

two faces form broad, rounded ridge where they join. Surface usually with small, whitish scurfy tubercles but some seeds practically smooth. Reddish-brown to black. 4.0-5.0 mm long, 3.5-4.0 mm wide.

Hedge Bindweed (*Convolvulus sepium*) Page 106

7. Seed scar oval, positioned in notched area parallel to long axis of the seed. Dorsal side strongly convex, two faces of ventral side form rounded ridge where they join. Surface with abundant, whitish, scurfy, blunt tubercles or wavy ridges. Greyish-brown. 4.0-4.5 mm long, 2.4-3.0 mm wide.

Field Bindweed (*Convolvulus arvensis*) Page 106

5. Not sector-shaped in cross section.
6. Tubercles spiny, arranged in rows on back, becoming broader, shorter, and rows more irregular approaching seed scar. Roughly circular or triangular in outline, appears like a crescent whose points have been pinched together. Craterlike depression near seed scar. Obovate or sector-shaped in cross section. Bluish-black to black. 3.3-3.7 mm long, 3.3-3.4 mm wide.

Corn Cockle (*Agrostemma githago*) Page 70

6. Roughened by irregular coarse ridges, and sparsely covered with pointed, broad, upraised areas, the interspaces granular or pebbled. Longitudinal ridge or seam from scar to chalaza on ventral side. Obovate in outline with slightly extended, flattened base. Circular in cross section. Seed scar brown, elliptical, hilum area oblique. Chalk-colored to light brown, some seeds with tiny, brown flecks. 3.0-4.0 mm long, 2.1-3.0 mm wide.

Snow-on-the-Mountain (*Euphorbia marginata*) Page 154

4. Less than 3.0 mm in length.
5. Surface with longitudinal, tubercled ribs.
6. Tapered from apex to base, sometimes slightly curved. Apex with short, stout protuberance; seed scar surrounded by collar and light colored remnant of seed stalk frequently attached. Ribs ten in number. Circular in cross section. Yellowish-brown to greyish-brown. 1.3-1.8 mm long, 0.7-1.0 mm wide.

Mayweed (*Anthemis cotula*) Page 112

5. Surface not longitudinally ribbed.
6. Margins broadly winged.
7. Circular to oval with margin wavy and with occasional notches. Center convex and with warty tubercles. Leathery in appearance. Brown to black. 1.5-2.5 mm in diameter.

Yellow Toadflax (*Linaria vulgaris*) Page 102

6. Margins not winged.

7. Black.

8. Roughly triangular or broadly obovate. Short, rounded tubercles in curved rows. Seed scar yellowish, oval, located on one margin immediately above extreme base. Broad groove runs from seed scar inward on each face of the seed. 0.6-0.9 mm long, 0.4-0.6 mm wide.

Common Purslane (*Portulaca oleracea*) Page 78

7. Greyish-brown or reddish-brown.

8. 0.5 to 0.8 mm long, 0.5-0.7 mm wide. Frequently sector-shaped but variable including circular or semi-circular shapes. Flattened. Tubercles short, rounded, sparsely arranged in curved rows on the upper part of the seed but with less definite pattern near the base. Base notched with thin, white seed stalk remnant frequently attached and short groove running inward. Reddish-brown.

Mouse Ear Chickweed (*Cerastium vulgatum*) Page 78

8. 1.1-1.3 mm long, 1.0-1.2 mm wide. Roughly circular in outline but slightly elongated at the base. Margins sometimes angular. Flattened. Tubercles short, rounded, relatively large for size of seed, arranged in curved rows. Base slightly notched and deep groove runs inward from the seed scar on each face. Greyish-brown to reddish-brown.

Common Chickweed (*Stellaria media*) Page 78

1. Surface not covered with tubercles.

2. Surface with spines or hairs.

3. Surface with longitudinal ribs.

4. Highly flattened, more than 6.0 mm in length.

5. One face covered with fine, whitish, appressed hairs; other face glabrous except for a few hairs along the margin area on some seeds. Margins highly winged and usually slightly curved upward. Apex notched and with two teeth, one on each side of the notch, but which may be broken off in handling. Broadly obovate in outline. Both faces with distinct but not highly prominent ribs or veins. Greyish-black. 8.0-13.0 mm long, 4.0-7.0 mm wide.

Prairie Dock (*Silphium terebinthinaceum*) Page 80

4. Not highly flattened, less than 6.0 mm in length.

5. Plano-convex; convex side with four prominent ribs bearing spines about 1.0 mm long. Lesser rib in each interspace. Flattened side with slight, spineless rib extending into a beak or head. Ovate or oval. Greyish-yellow to yellow. 2.5-3.4 mm long, 1.3-2.0 mm wide.

Wild Carrot (*Daucus carota*) Page 66

5. Five-angled, club-shaped. Five ribs, cross-grooved giving appearance of blunt protuberances. Inter-rib spaces roughened with warty protuberances. Usually densely covered with hairs which point in all directions. Greyish-brown to light brown. 4.0-5.0 mm long, 1.5-1.7 mm wide.

Wild Four O'Clock (*Mirabilis nyctaginea*) Page 118

3. Surface without longitudinal ribs.
4. Surface covered with spines.
5. Circular in outline.
6. Occasionally kidney-shaped. Surface covered with stiff, hooked spines between which are tubercles. Seed scar depressed, one end greatly enlarged and the other reduced in size; frequently having the outline of a bowling pin. Yellowish-brown or greyish-brown. 2.0-3.0 mm in diameter.

Bedstraw (*Galium aparine*) Page 92

5. Sector-shaped or obovate in outline.
6. One side or face with narrow "dagger-shaped" ridge surrounded by tubercles, the other face with depressed, "carrot-shaped" area covered with tubercles. Margins bear a double row of long, stout, capped or hooked spines. Grey to dark brown. 2.0-3.0 mm long, 1.0-1.5 mm wide.

European Sticktight (*Lappula echinata*) Page 66

6. One side or face flat, the other convex. Except for a prominent, triangular, concave seed scar on the convex side, the entire surface is covered with spines but they are more concentrated along the margins. Some spines may be broken off leaving a hollow spine remnant. Style frequently remains attached and curves back around the base. Brown or greyish-brown. 5.0-7.0 mm long, 4.0-5.0 mm wide.

Hound's Tongue (*Cynoglossum officinale*) Page 104

4. Surface covered at least in part with hairs.
5. Kidney-shaped in outline.
6. Usually with sparse, short hairs on the inner margins of the lobes; surface finely granular and with variable-shaped funguslike growths. Thickest along the outer margin and usually with a rounded, concave area on each face. Seed stalk remnant runs along and is attached to inner margin of the thinner lobe forming a narrow ridge and ending in a point extending beyond the lobe. Greyish-brown to brownish-black. 3.0-3.6 mm long, 2.2-2.6 mm wide.

Velvet Leaf (*Abutilon theophrasti*) Page 136

5. Not kidney-shaped in outline.
6. Seed scar horseshoe shaped with open end toward the base, white, parallel to the axis of the seed. Obovate in outline, ventral side with two flattened faces forming ridge where they join; dorsal side slightly convex. Dull, slightly roughened. Margins covered with numerous long, soft hairs. Reddish-brown to dark brown. 5.0-6.5 mm long, 4.0-5.0 mm wide.

Big Root Morning Glory (*Ipomoea pandurata*) Page 120

6. Seed scar oval, slightly raised. Roughly oval or ovate in outline. Angular in cross section, dorsal side convex, ventral side usually two-faced part way or the entire length of the seed. Surface semi-glossy, slightly wrinkled with sparse, long, soft hairs on surface, and a tuft at apex. Hairs may be broken off in handling. Yellow to brown. 3.5-4.5 mm long, 2.4-3.0 mm wide.

Wild Rose (*Rosa arkansana*) Page 136

2. Surface without spines or hairs.
3. Surface with longitudinal, transverse, concentric, or network of ribs, veins, or nerves.
4. Surface with longitudinal, transverse, concentric ribs, veins, or nerves.
5. Surface with concentric ridges.
6. Each face with 8-10 ribs, transversely grooved. Oval to ovate in outline; base slightly elongated, blunt, usually with white stalk remnant attached. Flattened, oval in cross section. Reddish-brown to black. 1.6-2.0 mm long, 1.1-1.4 mm wide.

Field Penny Cress (*Thlaspi arvense*) Page 150

6. Dorsal side strongly convex and with central, longitudinal ridge. Ventral side with broad, deep, central longitudinal furrow. Scutellum oblique, depressed, and with root-shoot axis a prominently raised ridge. Reddish-brown to reddish-black. 1.0-1.5 mm long, 0.9-1.1 mm wide.

Goosegrass (*Eleusine indica*) Page 150

5. Surface with transverse or longitudinal ribs or nerves.
6. Plano-convex.
7. Seed unit a spikelet with fertile floret enclosed by a longitudinally nerved, short papery glume and sterile lemma on flattened side and a second glume on the convex side. Glumes and sterile lemma sometimes removed in handling leaving a transversely ridged or granular fertile floret.
8. Surface of floret with irregular transverse ribs or ridges.
9. In edge view, floret highly convex, thickest at about the middle; yellowish-green to black depending on stage of maturity. Glumes and sterile lemma straw-colored, longitudinally nerved; second glume (convex side) about one-half the length of the seed leaving about one-half of fertile floret exposed. Oval to ovate. 2.5-3.0 mm long, 1.8-2.1 mm wide.

Yellow Foxtail (*Setaria lutescens*) Page 124

9. In edge view, floret highly convex, thickest below the middle. Yellowish-green to dark brown. Glumes and sterile lemma straw-colored, longitudinally nerved; second glume (convex side) about three-fourths or four-fifths the length of the seed leaving about one-fourth of fertile floret exposed. Ridges not as prominent as those of Yellow Foxtail. Oval to ovate. 2.2-2.5 mm long, 1.2-1.5 mm wide.

Giant Foxtail (*Setaria faberii*) Page 124

8. Surface of floret granular and without transverse ridge pattern.
9. In edge view, floret not highly convex. Floret yellowish and frequently mottled with dark brown; some florets completely dark brown. Glumes yellowish-green or straw-colored, longitudinally nerved; second glume about the same length as the floret. Oval to ovate. 1.8-2.2 mm long, 1.0-1.3 mm wide.

Green Foxtail (*Setaria viridis*)
Bristly Foxtail (*Setaria verticillata*) Page 124

(Green Foxtail and Bristly Foxtail are too similar to differentiate between them unless the bristles remain attached to the base. Bristly Foxtail has one, rarely two or three bristles, which are downwardly barbed. Green Foxtail has one to three bristles which are upwardly barbed.)

7. Seed unit not a spikelet.
8. Surface longitudinally ribbed.
9. Less than 6.0 mm in length.
10. Ovate with slightly extended apex. Dorsal side with five broad, yellowish-brown ribs and reddish-brown, granular inter-rib spaces. Flattened side has a dark colored, oval shaped center which is divided by a thin, light colored, longitudinal strip and surrounded by a lighter colored area. 2.4-3.3 mm long, 1.5-2.2 mm wide.

Spotted Water Hemlock (*Cicuta maculata*) Page 64

10. Ovate with slightly extended apex. Dorsal side with five broad, slightly wavy, light colored ribs and light brown, granular inter-rib spaces. Ventral side with central longitudinal groove. Greyish-brown to light brown. 2.5-3.5 mm long, 1.5-2.2 mm wide.

Poison Hemlock (*Conium maculatum*) Page 64

9. More than 6.0 mm in length.
10. Ovate in outline. Dorsal and ventral sides with sparse, fine, longitudinal ridges and transverse wrinkles. Broadest below the middle, gradually tapered to the apex which terminates in a short, pointed tip that frequently is broken off in handling. Seeds often slightly curved toward flattened side. Dark brown to black. 12.0-14.0 mm long, 4.5-5.0 mm wide.

Cocklebur (*Xanthium pensylvanicum*) Page 118

6. Not plano-convex.
7. More than 3.0 mm in length.
8. Highly flattened, margins winged, oval to almost circular in outline.
9. Apex with broad, shallow notch, base slightly extended with narrow notch on each side. Ventral side with central, longitudinal rib which has a dark brown, slightly curved stripe on each side; surface granular. Dorsal side with three fine ribs which alternate with four, dark brown stripes. Straw-colored to reddish-brown. 5.0-7.0 mm long, 4.0-5.7 mm wide.

Wild Parsnip (*Pastinaca sativa*) Page 104

7. Less than 3.0 mm in length.
8. Surface with either numerous longitudinal ribs or with ridges radiating from the hilum, but without transverse ribs.
9. White seed scar about in the middle of one face.
10. Shape highly variable, probably best described as roughly elliptical with angular margins. Surface appears pebbled but under magnification wavy ridges can be seen on the dorsal side and radiating from the hilum. Light to dark brown. 1.1-1.5 mm long, 0.6-0.8 mm wide.

Broad Leaf Plantain (*Plantago major*) Page 98

9. Without white seed scar on one face.
10. Triangular in outline; brownish-black to black with greyish or yellowish covering over part or all of the surface. Each side usually two-faced forming a diamond-shaped cross section, but some seeds may have one side convex. In edge view, seed curved. Finely ridged but from some angles surface may appear granular. Tip of base lighter colored; apex rounded with straw-colored style remnant in the middle. 1.7-2.5 mm long, 1.1-1.6 mm wide.

Marsh Elder (*Iva xanthifolia*) Page 114

10. Ovate to oval in outline; dorsal side convex, ventral side two-faced. Reddish or purplish-red, apex tipped with prominent, white, roughly triangular-shaped tissue. 1.5-2.0 mm long, 0.7-0.9 mm wide.

Wood Rush (*Juncoides campestre*) Page 154

8. Surface with prominent, transverse ribs and a lesser number of longitudinal ribs.
9. Surface with deep, broad, wavy, transverse ridges and several fine, longitudinal ridges. Oval to ovate, rounded at the apex and the two margins evenly and convexly tapered to a bluntly pointed base. Flattened. Brown. 1.3-1.5 mm long, 0.9-1.0 mm wide.

Yellow Wood Sorrel (*Oxalis stricta*) Page 150

9. Four-sided. Three angles are prominent, light colored, longitudinal ribs and the fourth is a longitudinal groove. Space between the angles highly roughened by irregular transverse ridges and concave depressions. Obovate. Chalaza inconspicuous, caruncle easily removed and usually absent. Greyish or dark brown. 1.1-1.5 mm long, 0.6-0.9 mm wide.

Nodding Spurge (*Euphorbia nutans*) Page 144

4. Surface partially or entirely covered by a network of ribs, ridges, nerves, or lines.
5. Hilum area extends to almost one-half the length of the seed.
6. Hilum V shaped, dark colored, a raised area encircled by a border and located in a notched-out area in the lower part of the seed. Surface covered with comparatively narrow veins; interspaces large, granular. Light brown to dark brown. 1.5-2.0 mm long, 1.0-1.2 mm wide.

American Germander (*Teucrium canadense*) Page 154

5. Hilum area does not extend to almost one-half the length of the seed.
6. Surface mottled with brown or black.
7. Surface smooth but with network of minute lines giving appearance of a checked egg. Oval to ovate in outline and oval in cross section. Apex rounded, base truncate. Yellow to olive-green background. 3.5-5.0 mm long, 2.2-3.0 mm wide.

Hemp (*Cannabis sativa*) Page 108

6. Surface not mottled with brown or black.
7. About cylindrical, globular, or broadly oval in cross section.
8. Cylindrical.
 9. Apex rounded with short, fine tip; base rounded with short, stout seed stalk remnant. One side frequently has membraneous wing. Roughened by fine network of veins evident under 10-12x magnification. Surface covered with resinous material giving a slightly glossy appearance. Dark brown to black. 1.0-1.3 mm long, 0.4-0.5 mm wide.

St. John's Wort (*Hypericum perforatum*) Page 154

9. Apex and base both rounded, hilum slightly raised with fine ridge joining it with the chalaza. Surface covered with network of fine light colored veins and relatively large, shallow, elongated, brown interspaces. 1.7-2.0 mm long, 1.1-1.3 mm wide.

Carolina Geranium (*Geranium carolinianum*) Page 114

8. Globular or oval.
 9. Base slightly extended to a point or short protuberance.
 10. Oval or cabbage-shaped in outline, oval in cross section. Apex with tiny, circular area; base slightly extended, hilum square or almost circular. Sides convex forming a prominently ridged edge. Surface with network of veins and large, shallow interspaces. Grey to greyish-brown. 2.2-2.5 mm from hilum to apex, 2.5-2.8 mm across. (Fruit)

Ball Mustard (*Neslia paniculata*) Page 102

10. Globular with short pointed base. Hilum elongated and depressed. Thin, corklike ridge runs from base to about the upper one-fourth of seed on one side. Surface with conspicuous network of veins, interspaces large, definite, smooth, and with slight sheen. Brownish-black to black. 1.6-1.9 mm in diameter.

Mexican Prickle Poppy (*Argemone mexicana*) Page 150

9. Base not extended to point or short protuberance.
10. Most seeds more than 2.0 mm long or in diameter.
 11. Surface with fine network of veins and shallow interspaces. Broad, rounded longitudinal rib (embryo) along one edge. Oval in cross section. Seed scar oval, usually located to one side of the base rather than in the middle. Brown to reddish-brown. 2.0-4.0 mm long, 1.7-2.3 mm wide.

Wild Radish (*Raphanus raphanistrum*) Page 138

10. Most seeds 2.0 mm or less in length or diameter.
11. 1.5-2.0 mm in diameter. Surface with network of fine veins, large, shallow interspaces. Globular or spheroid. Reddish-brown to black.

Indian Mustard (*Brassica juncea*) Page 138

11. 1.2-1.5 mm long, 1.1-1.3 mm wide. Surface with network of relatively thick veins and small, deep interspaces. Oval in outline, circular in cross section. Reddish-brown, frequently dark near the hilum.

Black Mustard (*Brassica nigra*) Page 138

7. Not cylindrical, globular, or broadly oval in cross section.
8. Fan-shaped, or about circular in outline (margins may or may not be wavy).
9. Fan-shaped.
10. Fan-shaped, upper one-fourth of seed thin, apex wavy or notched. Surface has several prominent veins running the length of the seed and give rise to numerous less distinct branch veins which fan out across the seed. Tan to reddish-brown. 3.0-4.0 mm long, 2.5-4.0 mm wide.

Saltbush (*Atriplex argentea*) Page 82

9. About circular in outline.
10. Enclosed by papery pericarp with wavy, winged margin which is turned upward giving the shape of a shallow dish. Bottom of pericarp has five veins running from hilum to the margin. Pericarp reddish-brown. 2.5-3.0 mm in diameter.

Winged Pigweed (*Cycloloma atriplicifolium*) Page 74

10. Shaped like a "curled tadpole" with its pointed tail extending slightly beyond the margin. Each face with a prominent groove extending from the "tail" to the center of the seed. Surface dull, usually with a network of veins of which the transverse are not as prominent as the longitudinal. Brown to reddish-brown or yellow if immature. 1.9-2.2 mm in diameter.

Clammy Weed (*Polansia graveolens*) Page 110

8. Not fan-shaped or circular in outline.
9. Black, surface broadly wrinkled, sector-shaped in cross section and with dense network of veins.
10. Veins thick, interspaces small and shallow; hilum triangular, tan to brown; mostly kidney-shaped in outline, sector-shaped in cross section. 3.0-3.8 mm long, 2.5-3.0 mm wide.

Jimson Weed (*Datura stramonium*) Page 92

10. Veins thin, interspaces small but deep; hilum a deep circular cavity with rounded edge the same color as the seed. Obovate or ear-shaped with wavy margin and right angle notch at the hilum. Sector-shaped in cross section. 2.5-3.0 mm long, 2.0-2.5 mm wide.

Buffalo Bur (*Solanum rostratum*) Page 92

9. Yellow, orange, tan, light or dark brown; faces slightly or strongly convex.
10. Faces strongly convex, veins branched at least in the upper part of the seed; tan, light or dark brown.
11. Margins winged, veins fine, papery; winged margin and veins tan, inter-vein spaces dark brown. Half moon or ear-shaped, both faces convex. 1.1-1.5 mm long, 0.7-1.1 mm wide.

Sulfur Cinquefoil (*Potentilla recta*) Page 90

11. Margins not winged, veins quite broad and rounded. Veins and interspaces both tan or light brown. Veins not as numerous as in Sulfur Cinquefoil. Half moon or ear-shaped, both faces convex. 0.8-1.0 mm long, 0.6-0.7 mm wide.

Rough Cinquefoil (*Potentilla norvegica*) Page 90

10. Faces slightly convex; pale yellow, deep yellow, or orangish.
11. Surface with a network of thin veins forming a definite pattern.
12. Veins with whitish cast, seed tapered in thickness from apex to the base which is slightly elongated and flattened to a thin edge. Hilum a closed slit. Pale yellow to deep yellow. Obovate in outline and both faces slightly convex. 1.0-1.6 mm long, 0.9-1.3 mm wide.

Black Nightshade (*Solanum nigrum*) Page 94

12. Veins with whitish cast and "lacquered" or translucent appearance. Seed slightly tapered in thickness from apex to base but base not terminating in a thin edge. Hilum a closed slit. Pale yellow. Obovate or kidney-shaped in outline with short groove or indentation in the face at the hilum area. Both faces usually slightly convex. 2.0-2.6 mm long, 1.7-2.0 mm wide.

Bitter Nightshade (*Solanum dulcamara*) Page 94

11. Surface without a network of thin veins.
12. Surface with network of thick, translucent veins, interspaces comparatively small and shallow.
13. Kidney-shaped or ear-shaped. Faces slightly convex. Hilum slightly depressed, narrowly ovate. Deep yellow. 2.0-2.5 mm long, 1.7-2.0 mm wide.

Clammy Ground Cherry (*Physalis heterophylla*) Page 94

12. Surface frequently with faint, curved veins along the margins but with fine, broken veins on the face providing no definite pattern and giving a granular appearance.
13. Surface with "varnished" appearance. Ob-ovate to oval, base sometimes extended and truncate. Faces slightly convex; hilum depressed and narrowly ovate. Pale to deep yellow but immature seeds orangish or reddish-brown. 2.0-2.4 mm long, 1.5-2.0 mm wide.

Carolina Horse Nettle (*Solanum carolinense*) Page 94

3. Surface without longitudinal, transverse, concentric, or network of ribs, veins, or nerves.
4. Surface glossy.
5. Lens-shaped in cross section.
6. Margins not winged or at least not distinctly winged, surface slightly roughened.
7. More than 1.0 mm in length or diameter.
8. Both faces of seed strongly convex. Most seeds circular with a few obovate. Notched at the hilum with prominent groove from notch inward on one side. Black. 1.5-2.0 mm in diameter. (without pericarp)

Maple Leaf Goosefoot (*Chenopodium hybridum* var. *gigantospermum*) Page 76

8. Both faces of seed convex but one face usually visibly flattened. Most seeds circular with a few obovate. Notched at the hilum with prominent groove from notch inward on one side. Black. 1.2-1.6 mm in diameter. (without pericarp)

Common Lambsquarters (*Chenopodium album*) Page 76

7. Less than 1.0 mm in length or diameter.
8. Kidney-shaped or ear-shaped to almost circular. Margin notched at the seed scar with shallow groove running inward. Surface minutely roughened. Dark red. 0.5-0.9 mm long, 0.4-0.7 mm wide.

Water Hemp (*Acnidia altissima*) Page 74

6. Margins winged, surface smooth.
7. Most seeds 1.0 mm and less in length or diameter.
 8. Narrowly winged, wings minutely striate, margin slightly notched at seed scar from which faint groove may run inward but more often the tip of base appears flattened or pinched. Obovate to circular. Black. 0.6-1.0 mm long, 0.6-0.9 mm wide.

Tumble Pigweed (*Amaranthus albus*) Page 72

8. Most seeds greater than 1.0 mm in length or diameter.
9. Most seeds 1.0-1.5 mm in length or diameter.
 10. Wings minutely granular or striate; margin slightly notched at seed scar and groove running inward for short distance. Obovate to circular. Black. 1.0-1.4 mm long, 0.7-1.0 mm wide.

Spiny Pigweed (*Amaranthus spinosus*) Page 72

10. Same description as for Spiny Pigweed, but seeds are reddish-black. 1.0-1.5 mm long, 0.6-1.0 mm wide.

Redroot Pigweed (*Amaranthus retroflexus*) Page 72

9. Most seeds more than 1.5 mm in length or diameter.
 10. Prominently winged, wings minutely granular or striate, sometimes faint evidence of this on the convex faces, margin slightly notched at the seed scar and groove runs inward for short distance. Black. 1.5-2.0 mm long, 1.0-1.4 mm wide.

Prostrate Pigweed (*Amaranthus graecizans*) Page 72

5. Not lens-shaped in cross section.
6. Less than 1.5 mm in length.
 7. Kidney-shaped with conspicuous protuberance on indented margin, flattened. Orange-red. 0.5-0.6 mm long, about 0.4 mm wide.

Carpetweed (*Mollugo verticillata*) Page 74

6. More than 1.5 mm in length.
7. Ventral side with prominent, narrow, longitudinal groove or cavity.
8. Groove runs through one end forming a cavity which is surrounded by broad, round, inturned margins. Dorsal side convex. Dark colored; depressed hilum located in center of groove. Light brown to dark brown with broad, yellowish stripe running down dorsal side. 2.3-2.6 mm long, 1.0-1.3 mm wide.

Buckhorn Plantain (*Plantago lanceolata*) Page 98

7. Ventral side without a prominent, narrow, longitudinal groove or cavity.
8. Two central, narrow, parallel, dark, longitudinal stripes on both the ventral side and dorsal side, and also along the margins.
9. Dorsal side slightly convex, ventral side two-faced forming a round, longitudinal ridge where they meet. Sector-shaped in cross section. Obovate or oval in outline. Brown to reddish-brown. White seed stalk remnant with V shaped tip. Surface slightly roughened, glossy. 1.6-2.2 mm long, 0.9-1.1 mm wide.

Heal All (*Prunella vulgaris*) Page 158

8. Without narrow, parallel, dark, longitudinal stripes on ventral side, dorsal side, and along the margins.
9. Circular in outline.
 10. Black. 1.8-2.1 mm in diameter. Surface finely but distinctly granular, glossy or dull. Seed scar in center of one face and part of pericarp usually persisting. Lower face convex, upper face flattened. Narrow groove runs from the margin up to or almost to the center. (without pericarp)

Winged Pigweed (*Cycloloma atriplicifolium*) Page 74

10. Dark tan to orange-brown. 4.0-5.0 mm in diameter. Surface pebbled or granular, ventral side with central, longitudinal ridge and a distinct angle or ridge along the margin. Both faces convex but ventral side sometimes appears two-faced. Seed scar surrounded by mass of tissue. Chalaza conspicuous and elevated.

Woolly Croton (*Croton capitatus*) Page 88

9. Not circular in outline.
 10. Oval to ovate in outline, mottled.
 11. Surface smooth but usually with a network of minute lines or veins similar in appearance to a checked egg. Base truncate, seed scar oval and deeply depressed. Yellow, tan, brown, or olive-brown and conspicuously mottled with black or brown. 3.5-5.0 mm long, 2.2-3.0 mm wide.

Hemp (*Cannabis sativa*) Page 108

10. Rhombic or roughly diamond-shaped in outline. Flattened, margins winged. Surface with rows of shallow depressions. Dark brown to mahogany with margins lighter colored. 3.0-4.0 mm long, 2.2-2.8 mm wide.

Sensitive Pea (*Cassia nictitans*) Page 156

4. Surface granular, pitted, with irregular depressions or scales; roughened or smooth but not glossy.
5. More than 10.0 mm in length.
6. Seeds flattened, 15.0-20.0 mm long, 7.0-8.0 mm wide. Oval or spindle-shaped, apex with broad point, base truncate. Seed scar tan, narrow, linear, surface granular. Margins with broad band of light brown; center a reddish-brown.

Wild Cucumber (*Echinocystis lobata*) Page 118

5. Less than 10.0 mm in length.
6. Triangular, kidney-shaped, ear-shaped in outline; spherical or coiled.
7. Kidney or ear-shaped.
8. Surface with warty, funguslike growths; seed stalk remnant frequently raised and partially detached at the hilum.
9. 3.0-3.5 mm long, 2.2-2.6 mm wide. Surface usually with sparse, short hairs along inner margins of lobes, finely granular, and variable shaped funguslike growths. Thickest along outer margin and usually with a rounded, concave area on each face. Seed stalk remnant runs along and is attached to the inner margin of the thinner lobe forming a narrow ridge and ending in a point extending beyond the lobe. Greyish-brown to brownish-black.

Velvet Leaf (*Abutilon theophrasti*) Page 136

9. 2.0-2.5 mm long, 1.6-2.0 mm wide. Surface without hairs, finely granular, with funguslike usually circular growths. Seed stalk remnant runs from hilum along inner edge of thinner lobe forming a broad, rounded ridge. Thickest along outer margin, small concave area on each face. Dark brown to black.

Venice Mallow (*Hibiscus trionum*) Page 136

8. Surface without warty, funguslike growths, seed stalk remnant absent.
9. Margin with narrow, deep, linear notch sometimes appearing as a notched circle.
10. Reddish-brown. Surface finely roughened, dull, lighter colored near the notch. Sector-shaped in cross section. 1.3-1.8 mm in diameter.

Common Mallow (*Malva neglecta*) Page 90

9. Margin without narrow, deep, linear notch.
10. One side or face distinctly more convex or bulged out than the other; more than 2.5 mm long.
11. Radicle thick, about one-half the length of seed ending in a blunt tip which diverges from cotyledons. Hilum a deep, circular cavity encircled by lighter colored band. Surface finely roughened, dull. Greenish-yellow. 3.0-4.0 mm long, 2.0-2.8 mm wide.

Wild Licorice (*Glycyrrhiza lepidota*) Page 146

10. One side or face not distinctly more convex or bulged out than the other; less than 2.5 mm long.
11. Radicle about one-half the length of the cotyledons, strongly divergent. Hilum tiny, circular or oval, and lies at the bottom of a deep indentation. Kidney-shaped in outline but not symmetrical. Surface smooth, dull. Yellow to yellowish-brown. 1.6-2.0 mm long, 1.0-1.5 mm wide.

Canadian Milk Vetch (*Astragalus canadensis*) Page 148

11. Radicle about two-thirds the length of seed, lies next to the cotyledons but diverges at the tip forming a point. Light colored line marks separation of radicle and cotyledons. Hilum a circular cavity. Surface dull, smooth. Greenish-yellow. 1.5-2.0 mm long, 1.0-1.5 mm wide.

Black Medic (*Medicago lupulina*) Page 156

7. Not kidney or ear-shaped.
8. Triangular or sector-shaped in outline.
9. Each face distinctly concave.
10. Flattened, a narrow groove runs from the concave area through the base. Apex rounded, base a blunt point. Surface dull, granular. Greenish-black to black. 1.8-2.1 mm long, 1.2-1.5 mm wide.

Kochia (*Kochia scoparia*) Page 76

9. Faces not concave.
10. Plano-convex, margin winged.
11. Flattened face usually has a broad, lighter colored band along the margins. Convex side sometimes two-faced, with thickly winged margin. Surface granular, convex side frequently with gold flecks. Hilum area circular, deep cavity, oblique, light colored. Light brown. 1.0-1.3 mm long, 0.6-1.0 mm wide.

Water Horehound (*Lycopus virginicus*) Page 148

10. Not plano-convex.

11. Roughly four-sided; diamond-shaped or rhombic in cross section.

12. Greyish-brown with yellowish, honey-like coating. Dull, granular. Apex rounded, frequently with short remnant of style; base pointed, frequently narrowly truncate. 1.7-2.4 mm long, 1.3-1.7 mm wide.

Poverty Weed (*Iva axillaris*) Page 114

12. Brownish-black to black with greyish or yellowish coating on part of the surface. Surface with fine longitudinal ribs which, from certain angles, may appear granular. Apex rounded, frequently with style remnant; base pointed, lighter colored. In edge view, usually curved. 1.7-2.5 mm long, 1.1-1.6 mm wide.

Marsh Elder (*Iva xanthifolia*) Page 114

8. Not triangular or sector-shaped in outline.

9. Spherical.

10. 2.7-3.6 mm in diameter; brownish-black to olive-brown or brown, mottled with black spots. Hilum about 2 mm long, .75 mm wide at widest part, one end tapered to a blunt point, centrally grooved, slightly depressed at its margins, convex. Chalaza a dark colored, raised point.

Narrow Leaf Vetch (*Vicia angustifolia*) Page 156

10. 1.3-1.7 mm in diameter, black or purplish-brown with immature seeds red. Dull, granular. Hilum linear, white, even with the surface.

Wild Mustard (*Brassica kaber*) Page 138

9. Not spherical.

10. Coiled or curled.

11. Conical, broad apex concave with short protuberance in the center. Seed coat transparent and embryo in the form of two coils, one inside the other. Embryo dark green in the center, becoming lighter toward the outside, outer rim is yellow. 1.8-2.2 mm long, 1.4-1.6 mm wide.

Russian Thistle (*Salsola kali* var. *tennuiifolia*) Page 76

6. Not triangular, kidney-shaped, ear-shaped in outline nor spherical, or coiled.
7. One face distinctly concave or one face with one or two white seed scars.
8. One face of seed concave.
9. 2.5-3.0 mm long, 1.3-1.5 mm wide. Dorsal side convex with shallow groove running across the middle. Ventral side concave with two brown, white margined seed scars in the center outside of which is an elliptical brown band and an elliptical white band. Dull, granular. Brown to reddish-brown.

Bracted Plantain (*Plantago aristata*) Page 98

8. Neither face of the seed concave.
9. White seed scar about in the middle of one face. Shape highly variable.
10. 1.1-1.5 mm long, 0.6-0.8 mm wide. Light to dark brown. Surface appears pebbled but under magnification wavy ridges can be seen radiating from the hilum and also covering the dorsal side. Shape highly variable, probably best described as roughly elliptical with angular margins.

Broad Leaf Plantain (*Plantago major*) Page 98

10. 2.0-2.6 mm long, 0.9-1.1 mm wide. Dark brown to black. Surface granular or pebbled. Shape highly variable probably best described as roughly elliptical with angular margins.

Black Seed Plantain (*Plantago rugelii*) Page 98

9. Two white seed scars on one face.
10. Two white, elliptical spots near the base of the ventral side mark the seed scar. Dorsal side convex, ventral side appears as convex or as two-sided with broad, rounded, central ridge. Surface dull, granular. Dark reddish-brown. 1.1-1.5 mm long, 0.9-1.1 mm wide.

Catnip (*Nepeta cataria*) Page 148

7. Neither of the faces concave and surface without white seed scar mark or markings.
8. Sector-shaped in cross section throughout or in part of the seed.
9. 3.5 mm or more in length.
10. Seed scar kidney or oval shaped.
11. Seed scar kidney-shaped, in oblique position, yellowish to reddish-brown, large, depressed. Dorsal side strongly convex, ventral side two-faced, each face with a broad concave area, and forming a rounded ridge where they join. Surface usually covered with small, whitish, scurfy tubercles, but some seeds practically smooth. Reddish-brown to black. 4.0-6.0 mm long, 3.5-4.0 mm wide.

Hedge Bindweed (*Convolvulus sepium*) Page 106

11. Seed scar oval, positioned parallel to the long axis in a notched area; small, depressed. Dorsal side strongly convex; ventral side with two faces which form a rounded ridge where they join. Surface covered with abundant whitish, scurfy, blunt tubercles or wavy ridges. Greyish-brown. 4.0-4.5 mm long, 2.4-3.0 mm wide.

Field Bindweed (*Convolvulus arvensis*) Page 106

10. Seed scar horseshoe-shaped, granular.
11. Seed scar without hairs or with only a few, short hairs. Dorsal side convex with broad, shallow, longitudinal groove in the middle. Ventral side two-faced forming a ridge where they join, each with one or two cross wrinkles. Narrow line along the outer margin of each face. Surface finely granular. Brown to black. 4.7-5.7 mm long, 3.3-4.0 mm wide.

Common Morning Glory (*Ipomoea purpurea*) Page 120

11. Seed scar with erect, coarse, greyish hairs. Dorsal side convex with shallow, longitudinal depression in the middle. Ventral side with two faces which form a ridge where they join. Each face without wrinkles and slightly sunken along the outer margins. Surface finely granular. Dark brown to black. 5.0-6.0 mm long, 3.0-4.0 mm wide.

Ivy Leaf Morning Glory (*Ipomoea hederacea*) Page 120

9. Less than 3.5 mm in length.
10. Small, less than 2.0 mm in length.
11. Tan to yellowish-tan. Surface granular, its texture like that of very fine sandpaper.
12. Most seeds 1.0 mm or less in length.
13. Hilum area small, oval or circular area, darker colored than the seed, in a slightly oblique position, level with the surface, and with small, white dot in the center. Shape variable, most frequently oval or with margins bulged. Most seeds with dorsal side convex, ventral side two-faced forming a rounded, longitudinal ridge which runs from apex almost to the base. 0.7-1.0 mm long, 0.5-0.7 mm wide.

Small Seed Alfalfa Dodder (*Cuscuta planiflora*) Page 110

12. 1 mm or more in length.
13. Hilum area large for seed size, oval or circular, depressed, with small, white line in the center; strongly oblique. One side of seed frequently bulges above the hilum area. Shape variable but most frequently oval or obovate. Most seeds with dorsal side convex, ventral side two-faced forming a rounded longitudinal ridge extending from apex to about the lower one-third of the seed. 1.1-1.6 mm long, 0.9-1.3 mm wide.

Field Dodder (*Cuscuta pentagona*) Page 110

11. Brownish-black or black.
12. Hilum area broadly triangular, oblique, with sharp, central ridge. Ovate to obovate in outline, apex rounded, base slightly elongated. Ventral side becomes two-faced in the lower one-half of the seed. Surface dull, finely granular. 0.9-1.1 mm long, 0.5-0.8 mm wide.

American Pennyroyal (*Hedeoma pulegioides*) Page 158

10. More than 2.0 mm in length.
11. Hilum sector-shaped in outline, oblique, truncate, depressed and with a papery ridge. Lower one-half to two-thirds of ventral side two-faced. Obovate in outline. Surface roughened. Reddish-brown with a greyish mottled covering giving the appearance of a reddish-brown seed which has been rolled on a surface of fresh, grey paint. 2.5-3.2 mm long, 1.5-2.0 mm wide.

Hempnettle (*Galeopsis tetrahit*) Page 156

11. Hilum white, curved, elongated with long axis running across the seed; frequently constricted in the center and with a central furrow. Dorsal-ventral margins may be slightly winged near the apex. Apex wavy, sometimes with one or two short teeth and with an area of "raw, roughened" tissue. Ventral side two-faced and central ridge runs the entire length of the seed. Surface granular. Dark brown. 2.1-3.0 mm long, 1.2-1.8 mm wide.

Dragonhead Mint (*Dracocephalum parviflorum*) Page 136

8. Not sector-shaped in cross section.
9. Circular in outline.
10. Seeds enclosed in tissuelike, translucent covering.
11. Seed enclosed in a tan, membraneous pericarp which has a honeycomb or network appearance in certain areas and is thick enough to give the seed a tan appearance but yet thin enough to detect the black color of the seed. Some seeds may still be enclosed in a perianth which is five-parted but this is generally removed in handling. 1.5-2.0 mm in diameter. (with pericarp)

Maple Leaf Goosefoot (*Chenopodium hybridum*
var. *gigantospermum*) Page 76

11. Seed enclosed in a greyish or tan, membraneous pericarp which has a granular appearance, and because it is very thin the black color of the seed is evident. Some seeds may still be enclosed in a five-parted perianth, each part with a central, longitudinal ridge. Perianth usually removed in handling. 1.2-1.6 mm in diameter. (with pericarp)

Common Lambsquarters (*Chenopodium album*) Page 76

10. Seed not enclosed by tissuelike, translucent pericarp.
11. Thickly lens-shaped, margins winged and with one small notch. Greyish-black to black, margins usually light brown. Surface dull, roughened. 1.1-1.7 mm in diameter.

Corn Spurry (*Spergula arvensis*) Page 78

11. One face strongly convex with seed scar in the center and sometimes with part of the pericarp persisting. Other face flattened. Surface distinctly granular, dull or glossy. Margin with a notch and groove running inward almost to the center. Black. 1.8-2.1 mm in diameter.

Winged Pigweed (*Cycloloma atriplicifolium*) Page 74

9. Not circular in outline.

10. Plano-convex or pyramidal.

11. Plano-convex.

12. Flattened side slightly wrinkled and margin frequently slightly raised. Convex side smooth. Callus circular with black, white tipped stalk remnant. Short, needlelike appendage may to be present at the apex. Tan or light brown. 2.6-3.5 mm long, 2.0-3.0 mm wide. (caryopsis)

Field Sandbur (*Cenchrus pauciflorus*) Page 146

11. Pyramidal, surface with scalelike tissue.

12. Three to five-sided when viewed with the seed scar up. Surface roughened by dense, reddish-brown scalelike tissue. Seed scar narrowly oblong, black, smooth. 0.9-1.2 mm long, 0.6-0.9 mm wide.

Scarlet Pimpernel (*Anagallis arvensis*) Page 116

10. Not plano-convex or pyramidal.

11. Seed with dark, zigzag lines running in various directions or with a seam, line, or groove (raphe), of the same or different color than the seed, running from the base to the apex.

12. White, greyish, tan, light brown or brown with dark, zigzag lines.

13. Dorsal side convex, ventral side two-faced. Tan to light brown with dark brown zigzag lines. Broadly ovate in outline. Surface dull, smooth. White, conical remnant of seed stalk usually attached to hilum. 2.0-2.4 mm long, 1.4-1.6 mm wide.

Lanceleaf Sage (*Salvia reflexa*) Page 158

13. Both sides convex. White, greyish, or brown with black mottling or zigzag pattern. Surface with faint longitudinal lines, covered with fine hairs which are particularly evident at apex but many may be broken off in handling. Tip of base and margin smooth for short distance. Obovate or narrowly triangular in outline. 5.5-8.0 mm long, 2.2-2.6 mm wide.

Sunflower (*Helianthus annuus*) Page 82

12. Distinct groove or seam (raphe), of the same or different color than the seed, runs from seed scar to chalaza (base to the apex); about circular in cross section.
13. Surface smooth.
14. Greyish-white to greyish-brown and usually mottled or flecked with brown. Dark seam (raphe) runs from hilum to a circular, slightly depressed, rimmed chalaza area at the apex. Broadly obovate in outline. Seed scar usually covered with prominent, yellowish-brown growth (caruncle). 2.0-2.5 mm long, 1.3-1.5 mm wide.

Leafy Spurge (*Euphorbia esula*) Page 144

14. Reddish-brown or brown with greyish cast. Seam or line (raphe), the same color as the seed, runs from the hilum to a circular, slightly depressed, chalaza area at the apex. Hilum lies in vertical position and yellowish-brown caruncle is usually present. Broadly ovate or oblong in outline. 1.8-2.1 mm long, 1.2-1.5 mm wide.

Cypress Spurge (*Euphorbia cyparissias*) Page 144

13. Surface distinctly roughened.
14. Greyish-white to black with many seeds appearing to have been "rolled in flour." Surface dull, with shallow, irregular pits or depressions. Broadly obovate in outline. Caruncle lacking; hilum area oblique. 2.0-2.5 mm long, 1.3-1.5 mm wide.

Flowering Spurge (*Euphorbia corollata*) Page 144

14. Chalk-covered to light brown, some seeds with tiny brown flecks. Surface highly roughened by irregular, coarse ridges and sparse, raised points with interspaces granular or pebbled. Broadly obovate in outline with slightly extended, flattened base. Caruncle lacking; hilum area oblique. 3.0-4.0 mm long, 2.1-3.0 mm wide.

Snow-on-the-Mountain (*Euphorbia marginata*) Page 154

11. Seeds without dark zigzag lines, dark seam or groove running from base to apex.
12. Margins winged, at least part way around the seed.
13. Reddish-brown to purplish-brown. Both faces convex but may be flattened in immature seeds. Single groove runs inward from hilum parallel to and near the margin to a point near the apex and marks the separation of the radicle from the cotyledons. Circular to obovate. Surface dull, finely granular. 1.5-1.9 mm long, 1.3-1.7 mm wide.

Hoary Alyssum (*Berteroa incana*) Page 140

13. Orange to reddish-yellow. Flattened, thickest at the cotyledon edge and tapering to the radicle edge. Single groove runs inward from the hilum about in the central part of the seed and approximately to the upper one-fourth of the seed. Base may have remnant of white seed stalk and frequently with a slight notch. Obovate or with one edge convex and the other edge straight. Convex edge winged; wing usually lighter color. Dull, finely granular. 1.1-1.5 mm long, 0.7-1.0 mm wide.

Virginia Pepperweed (*Lepidium virginicum*) Page 142

12. Margins not winged.
13. In edge view one side is prominently humped at about the middle and two faces slope downward to each end of the seed giving a "roof"-shaped appearance.

14. 1.5 mm or less in length.

15. Mostly dark, reddish-brown with some seeds light reddish-brown. Surface granular but fine longitudinal lines may appear on parts of many seeds. Fine groove runs from base to near the apex marking the separation between the radicle and cotyledons. Apex usually rounded like the tip of a finger or sometimes oblique with rounded corners. Oblong. 1.1-1.5 mm long, 0.7-0.9 mm wide.

Hedge Mustard (*Sisymbrium officinale*) Page 152

15. Yellowish-brown to light brown. Surface finely granular and without fine longitudinal lines. Groove runs from base to near the apex marking separation of radicle and cotyledons. Apex frequently oblique and with rounded corners, or rounded like tip of a finger. Oblong. 0.8-1.1 mm long, 0.5-0.6 mm wide.

Tumble Mustard (*Sisymbrium altissimum*) Page 152

14. More than 1.5 mm in length.

15. Brown, covered with whitish or yellowish waxy material giving the seed a greyish appearance. Prominently roughened by numerous, fine pits. Network of ridges and shallow interspaces may appear but frequently obscured. Groove runs from base usually to about the middle of the seed or slightly further. Transverse ridge rounded. Apex may be rounded like the tip of a finger but sometimes about straight across with rounded corners. Oblong. 1.5-1.9 mm long, 0.8-1.0 mm wide.

Yellow Rocket (*Barbarea vulgaris*) Page 140

13. In edge view one side not humped near the middle and without two faces sloped downward to each end.

14. Seed with prominent rib (radicle) or with one or two longitudinal grooves or lines separating the radicle from the cotyledons.

15. More than 1.5 mm in length.

16. In apex view, seed is flattened and tapers from the cotyledon edge to the radicle edge.
17. Groove runs inward from base gradually veering away from the margin and ending at about the middle or at the upper one-fourth of the seed. Surface dull, finely granular. Apex rounded, base notched. Oval to obovate. Dark reddish-brown or deep purplish-red. 1.8-2.2 mm long, 1.1-1.5 mm wide.

Hoary Cress (*Cardaria draba*) Page 142

16. In apex view, seed is roughly circular.
17. Convexly tapered from apex to a pointed base.
18. Radicle lies close to the cotyledons and does not form a prominent bulging rib; about same length as cotyledons. A light line runs inward from the hilum separating the radicle and the cotyledons; radicle tip flattened and located on center. Surface granular, dull. Dark brown to dark reddish-brown. 2.0-2.5 mm long, 1.1-1.5 mm wide.

Field Pepperweed (*Lepidium campestre*) Page 142

17. Not convexly tapered from apex to a pointed base.
18. Radicle distinctly wider in the middle than either the tip or immediately below the apex.
19. Radicle appears to be folded over the apex of the seed; wide and flat at the apex, narrowed in the upper part, wider in the middle, and tapered to blunt tip. A groove, on either side of the radicle, continues to the apex and recurves to the base separating the radicle

from the cotyledons. Finely granular. Oval to ovate in outline; in cross section oval with semi-circular top notch. Golden-brown to reddish-brown. 2.0-2.4 mm long, 1.1-1.3 mm wide.

Large Seed False Flax (*Camelina sativa*) Page 140

18. Radicle not distinctly wider in the middle than immediately below the apex.
19. Dark brown or dark reddish-brown, granular.
20. Radicle thick, forms prominently bulged rib which is frequently longer than the cotyledons, tip not flattened and generally lies off center. A groove, on either side of radicle, extends about to the apex. Roughly oblong. Granular. 2.2-2.8 mm long, 1.0-1.3 mm wide.

Hare's Ear Mustard (*Conringia orientalis*) Page 152

19. Yellow to yellowish-brown, slightly wrinkled.
20. Radicle thick, forms prominently bulged rib, frequently longer than the cotyledons, lies on center. Groove on each side of the radicle extends to the apex. Base of cotyledons has prominent, dark reddish-brown circular spot. 1.9-2.2 mm long, 1.0-1.3 mm wide. (seed)

Ball Mustard (*Neslia paniculata*) Page 102

15. Less than 1.5 mm in length.
16. Flattened, about same thickness across the seed.

17. Each face has a groove which runs, about parallel to the margin, from the base to the apex and curves back to the base. Finely roughened. Oval to obovate but base more or less truncate with slight, white seedstalk remnant sometimes attached to the base. Golden-brown to reddish-brown but darker at the base. 0.9-1.2 mm long, 0.4-0.6 mm wide.

Shepherd's Purse (*Capsella bursa-pastoris*) Page 142

16. Not flattened, not the same thickness across the seed.
17. Golden-brown to light brown with ends of cotyledons and radicle a darker brown. Surface roughened and faint, irregular lines may be seen on parts of the seed. Each face with a groove which runs, about parallel to the margin, from the base to the apex and curves back to the base. Radicle forms prominent rib. Oval to obovate but base somewhat truncate. 1.0-1.2 mm long, 0.6-0.8 mm wide.

Dog Mustard (*Erucastrum gallicum*) Page 152

17. Dark reddish-brown with base extremity darker colored. Surface distinctly pebbled or granular. Each face with a groove which runs, about parallel to the margin, from the base to the apex and curves back to the base but much more prominent next to the radicle. Radicle forms prominent rib which tapers from apex to base. Oval to obovate, but base somewhat truncate. 1.1-1.3 mm long, 0.6-0.8 mm wide.

Small Seed False Flax (*Camelina microcarpa*) Page 140

Bidens bipinnata
Annual

Other common names: Cuckold.

Highly elongated, oblong, angular, widest near the middle and slightly tapered to both ends. Apex bears three or four stiff, downwardly barbed spines. Angles slightly raised, faces slightly depressed and longitudinally grooved. Hilum circular, smooth, usually oblique. Light brown to black. 8.5-11.5mm long, 0.5-1.1mm wide.

SPOTTED WATER HEMLOCK

Parsley Family

Cicuta maculata
Perennial

Other common names: Cicuta, Spotted Hemlock, Spotted Cowbane, Beaver Poison, Muskrat Weed, Musquash Root, Water Hemlock, Children's Bane, Death-Of-Man.

Fruit oval to circular in outline with flared apex and consists of two seeds. A seam runs down the middle of each face marking where the two seeds are joined and at which point it frequently splits producing two ovate, plano-convex seeds. Apex slightly extended, dorsal side with five broad, yellowish-brown, longitudinal ribs and reddish-brown, granular interspaces. The flattened side of each seed has a dark colored, oval-shaped center which is divided by a thin, light-colored longitudinal strip and surrounded by a lighter colored area. 2.4-3.3mm long, 1.5-2.0mm wide.

POISON HEMLOCK

Parsley Family

Conium maculatum
Biennial

Other common names: European Hemlock, Queen Anne's Lace, California Fern, Carrot Fern, Spotted Parsley, Deadly Hemlock, Spotted Cowbane, Poison Stinkweed, Wode Thistle, Herb of St. Bennet, Snake Weed, Poison Parsley.

Fruit oval to circular in outline with a slightly flared apex and with a longitudinal seam on each face marking where the two seeds are joined and at which point it splits producing two plano-convex seeds. Seed ovate in outline and with slightly extended apex; plano-convex. Dorsal side highly convex and with five prominent, slightly wavy, smooth, broad, light-colored, longitudinal ribs. Inter-rib spaces granular and light brown. Ventral side flattened or slightly concave and with central, longitudinal groove. Seeds frequently slightly curved. Greyish-brown to light brown. 2.5-3.5mm long, 1.5-2.2mm wide.

RED STEM FILAREE

Geranium Family

Erodium cicutarium
Annual or Biennial

Other common names: Alfilaria, Pin Clover, Storkbill, Pin Grass, Pin Weed, Heron's Bill.

Cone-shaped in outline; circular in cross section. Apex is an oval, oblique cavity with a flanged rim from which arises a long, twisted awn that terminates in a prominent "corkscrew" hook. Base sharply tipped and covered with tuft of hairs. Surface covered with ascending hairs. Orange-brown to reddish-brown. 3.0-4.2mm long, 0.7-1.0mm wide.



Spanish Needles 2.4X
Bidens bipinnata



Spotted Water Hemlock 5.8X
Cicuta maculata



Poison Hemlock 5.8X
Conium maculatum



Red Stem Filaree 2.4X
Erodium cicutarium

Lappula echinata
Annual or Winter Annual

Other common names: Blue Stickseed, Sticktight, Stickseed, Hairy Stickseed, Sheep Bur, Burweed, European Stickseed, Burseed, Bur-Forget-Me-Not, Stickweed, Blue Bur.

Sector or pear-shaped in outline. One face with narrow, "dagger-shaped" ridge surrounded by tubercles; the other face with a depressed, "carrot-shaped" area covered with tubercles. The margins are covered with a double row of long, stout, capped or hooked spines. The spines are weak and some are usually broken off in handling. Grey to dark brown. 2.0-3.0mm long, 1.0-1.5mm wide.

DEVIL'S BEGGARTICKS

Composite Family

Bidens frondosa
Annual

Other common names: Sticktight, Devil's Pitchfork, Bur Marigold, Devil's Boot-Jack, Pitchfork Weed, Preacher's Lice, Beggarticks.

Elongated, roughly oblong in outline; broadest near the apex and slightly tapered to a truncate base and more sharply to the apex. At the apex two downwardly barbed awns, about 3.0-4.0mm in length, extend from the margins. Highly flattened and sometimes slightly "curled" both crosswise and lengthwise. Surface roughened by short, wartlike protuberances and each side has a central rib running the entire length of the seed. Margins usually serrated with the teeth pointing upward. Seed scar elliptical and depressed. Light brown to dark brown. 6.0-11.0mm long, 3.0-4.0mm wide.

WILD CARROT

Parsley Family

Daucus carota
Biennial

Other common names: Lace Flower, Bird's Nest, Queen Anne's Lace, Devil's Plague.

Ovate to oval in outline; plano-convex. Convex side with four prominent ribs bearing spines about 1.0mm in length. Between each main rib is a lesser rib which bears smaller spines. The flattened side has a slight, central, spineless rib which extends into a head or tip about 0.4-0.6mm in length. Some of the rib spines may be broken off in handling. Greyish-yellow to yellow. 2.5-3.4mm long, 1.3-2.0mm wide.

SPOTTED CAT'S EAR

Composite Family

Hypochoeris radicata
Perennial

Other common names: Gosmore, Long-Rooted Cat's Ear, Flatweed, Cat's Ear, False Dandelion, Coast Dandelion.

Highly elongated, narrowly elliptical. Broadest at about the middle or slightly above, gradually tapered to a narrow, oblique, truncate base and upward to the apex which terminates into a long, roughened awn which is tipped by a parachute of hairs. Parachute readily detached and usually absent; awn easily broken off and usually only a part of it remains. About circular in cross section. Surface with 15 longitudinal ribs which are covered with warty protuberances that become spiny near the apex. Seed scar, depressed, oblique, usually white, and surrounded by a rimmed collar. Brown to reddish-brown. 4.5-5.5mm long, 0.5-0.7mm wide.



European Sticktight 3.6X
Lappula echinata



Devil's Beggarticks 3.6X
Bidens frondosa



Wild Carrot 3.6X
Daucus carota



Spotted Cat's Ear 3.6X
Hypochoeris radicata

WHITE COCKLE

Pink Family

Lychnis alba
Biennial

Other common names: White Champion, White Robin, Evening Lychnis, Snake Cuckoo, Thunder Flower, Bull Rattle.

Kidney-shaped in outline; margins rounded, obovate in cross section. Surface densely covered with short, blunt tubercles which are borne on oblong plates, arranged in definite rows on the back and along the margins, but not in a definite pattern on the faces. Seed scar cavity oval and about one-half to two-thirds surrounded by a short, prominent collar formed by the plates. Greyish-brown to bluish-grey. 1.3-1.5mm long, 0.9-1.3mm wide.

BLADDER CAMPION

Pink Family

Silene cucubalis
Perennial

Other common names: White Bottle, Cowbell, Maiden's Tear, Bubble Poppy, Spattling, Behen, Rattle Weed.

Kidney-shaped in outline; in cross section, slightly tapered away from convex margin. Surface covered with pointed tubercles which are borne on elliptical to oblong, greyish plates. Tubercles arranged in rows; usually three or four rows are evident on each side or face. The scar cavity is flanked on each side with a prominent, raised pad of long, very narrow plates. Tubercles arranged in rows immediately adjacent to one end of the seed scar but not in rows immediately adjacent to the other end. The two ends of the seed are about the same size. Grey to greyish-black. 1.0-1.7mm long, 0.9-1.1mm wide.

SLEEPY CATCHFLY

Pink Family

Silene anthirrhina
Annual

Other common names: Tarry Cockle.

Kidney-shaped in outline; in cross section slightly tapered away from the convex margin. Surface frequently covered with pointed but sometimes blunt tubercles borne on rounded plates. Tubercles not arranged in a pattern of definite rows on the faces but usually in definite rows on the back and margins. The seed scar cavity is usually narrowly elliptical or only a small oval depression and is flanked on each side by a small, but distinct band of narrow plates. Dorsal side rounded across, tubercles in rows immediately above and below the seed scar cavity. Lead-grey to black. 0.5-0.7mm long, 0.4-0.5mm wide.

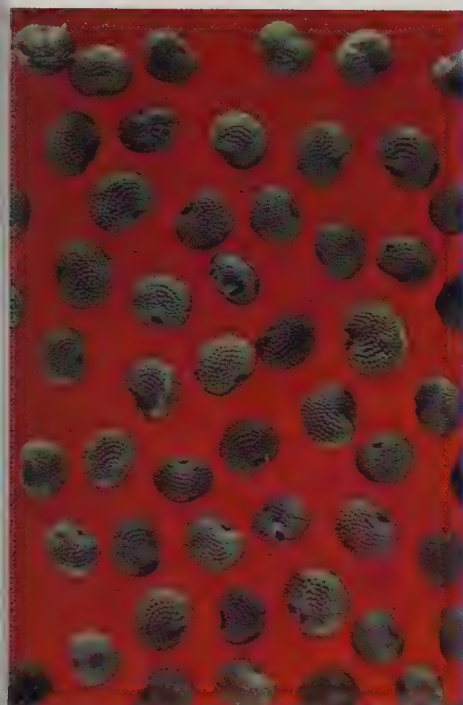
NIGHT FLOWERING CATCHFLY

Pink Family

Silene noctiflora
Annual or Winter Annual

Other common names: Sticky Cockle, Clammy Cockle.

Kidney-shaped in outline; in cross section slightly tapered away from the convex margin. Surface covered with short, blunt tubercles borne on roundish, grey plates which become oblong near the seed scar. Tubercles crowded, not arranged in a pattern of definite rows on the faces of the seed, but in six to eight crowded rows on the dorsal side. The seed scar cavity is flanked on each side by a narrow, raised pad of elongated plates. Tubercles in crowded, but definite rows immediately above and below the seed scar cavity. Light grey to greyish-brown. 1.0-1.5mm long, 0.9-1.1mm wide.



White Cockle 5.8X
Lychnis alba



Bladder Campion 5.8X
Silene cucubalus



Sleepy Catchfly 5.8X
Silene antirrhina



Nightflowering Catchfly 5.8X
Silene noctiflora

COW COCKLE

Pink Family

Saponaria vaccaria
Annual

Other common names: Cowherb, Cowbasil, China Cockle, Pink Cockle, Spring Cockle.

Globular. Surface dull, covered with short, oval, pimplelike tubercles, which are arranged in rows or in a particular pattern. Broad, shallow, depressions are frequently present in the hilum area. Hilum depressed, circular to oval, white. Black to bluish-black. 2.0-2.7mm in diameter.

CORN COCKLE

Pink Family

Agrostemma githago
Winter Annual

Other common names: Purple Cockle, Corn Campion, Corn Rose, Crown-of-the-Field, Mullein Pink, Corn Mullein, Old Maid's Pink.

Roughly triangular or almost circular in outline with deep craterlike depression near the seed scar. Appears as if a plump crescent had been pinched together by its points with one point extending slightly beyond the other. Thickest at the outer margin and tapered toward the scar giving an obovate or sector-shaped cross section. Surface covered with spiny tubercles arranged in rows on the back but with the tubercles becoming broader and shorter and the rows more irregular approaching the seed scar. Bluish-black to black. 3.3-3.7mm long, 3.0-3.4mm wide.

HAIRY CATCHFLY

Pink Family

Silene dichotoma
Annual or Winter Annual

Other common names: Forked Catchfly.

Kidney-shaped in outline but with one end of the seed usually narrower than the other giving more of an ear-shaped appearance. In cross section, slightly tapered away from the convex margins which are obtusely angled and in end view appears four-sided. In end view the dorsal side frequently is distinctly slanted to one side. Surface covered with blunt tubercles which are borne on oblong or elliptical plates. Tubercles arranged in rows, usually four or five rows on each face. The scar cavity is flanked on each side by a narrow, raised pad of elongated plates. Tubercles not in rows immediately above and below the scar cavity. Faces frequently have a concave cavity near the scar. Grey to greyish-brown. 1.3-2.0mm long, 0.9-1.1mm wide.

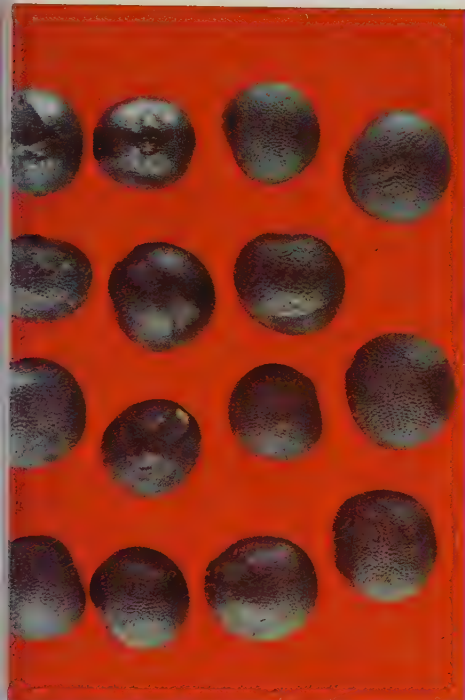
BOUNCING BET

Pink Family

Saponaria officinales
Perennial

Other common names: Soapwort, Bruisewort, London Pride, Hedge Pink, Fuller's Herb, Old Maid's Pink, Lady-by-the-Gate, Scourwort, Sweet Betty, Wild Sweet William.

Kidney-shaped in outline; obovate or sector-shaped in cross section. Dorsal side strongly curved, ventral side with a narrow, but very deep notch at the bottom of which lies the hilum. Each face or side has a shallow indentation near the hilum area. The surface is covered with wide, blunt, short tubercles which are arranged in rows on the back and on the two faces. The tubercles are not borne on plates and the surface has a "varnished" appearance. 1.5-2.2mm long, 1.1-1.5mm wide.



Cow Cockle 5.8X
Saponaria vaccaria



Corn Cockle 5.8X
Agrostemma githago



Hairy Catchfly 5.8X
Silene dichotoma



Bouncing Bet 5.8X
Saponaria officinales

TUMBLE PIGWEED

Amaranth Family

Amaranthus albus
Annual

Other common names: Tumbling Amaranth, Tumbling Pigweed, White Pigweed.

Obovate to circular in outline; lens-shaped in cross section. Margins narrowly winged, wings minutely striate. Margin slightly notched at the seed scar from which a faint groove runs inward and the tip of the base frequently appears pinched or flattened. Surface smooth, highly glossy. Black. 0.6-1.0mm long, 0.6-0.9mm wide.

PROSTRATE PIGWEED

Amaranth Family

Amaranthus graecizans
Annual

Other common names: Spreading Amaranth, Spreading Pigweed, Mat Amaranth, Prostrate Amaranth, Matted Pigweed, Low Amaranth, Tumbling Pigweed, White Pigweed, Tumble Weed.

Obovate to circular in outline; lens-shaped in cross section. Margins prominently winged, wings minutely striate with faint evidence of this sometimes appearing on convex faces. Margin slightly notched at seed scar from which groove runs inward for short distance. Surface smooth, highly glossy. Black. 1.5-2.0mm long, 1.0-1.4mm wide.

REDROOT PIGWEED

Amaranth Family

Amaranthus retroflexus
Annual

Other common names: Green Pigweed, Rough Pigweed, Green Amaranth, Wild Beet, Chinaman's Greens, Careless Weed, Amaranth Pigweed.

Obovate to circular in outline; lens-shaped in cross section. Margins winged, wings minutely granular or striate. Margin slightly notched at seed scar from which groove runs inward for short distance. Surface smooth, highly glossy. Reddish-black. 1.0-1.5mm long, 0.6-1.0mm wide.

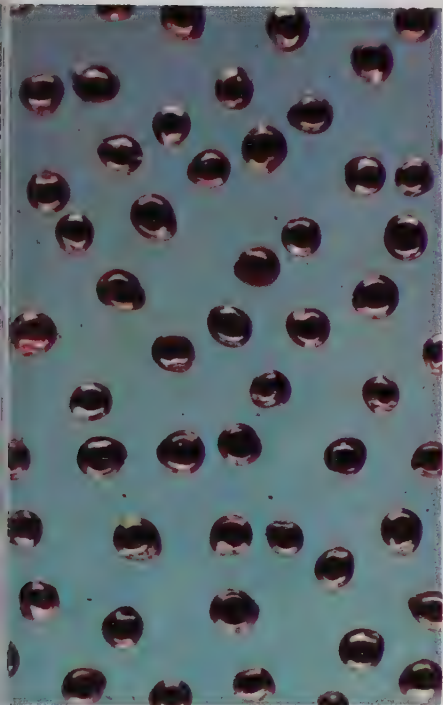
SPINY PIGWEED

Amaranth Family

Amaranthus spinosus
Annual

Other common names: Spiny Amaranth, Thorny Amaranth, Soldier Weed, Prickly Careless Weed.

Obovate to circular in outline; lens-shaped in cross section. Margins winged, wings minutely granular or striate. Margin slightly notched at seed scar from which groove runs inward for short distance. Surface smooth, highly glossy. Black. 1.0-1.4mm long, 0.7-1.0mm wide.



Tumble Pigweed 5.8X
Amaranthus albus



Prostrate Pigweed 5.8X
Amaranthus graecizans



Redroot Pigweed 5.8X
Amaranthus retroflexus



Spiny Pigweed 5.8X
Amaranthus spinosus

WATER HEMP

Amaranth Family

Acnidia altissima
Annual

Other common names: Tall Water Hemp.

Kidney-shaped, ear-shaped, to almost circular in outline; lens-shaped in cross section. Margin notched at seed scar with white remnant of seed stalk frequently present. Surface highly glossy but minutely roughened. Dark red. 0.5-0.9mm long, 0.4-0.7mm wide.

CARPETWEED

Carpetweed Family

Molluga verticillata
Annual

Other common names: Whorled Chickweed, Indian Chickweed, Devil's Grip.

Kidney-shaped in outline with a conspicuous protuberance on the indented margin. Flattened, lens-shaped. Surface smooth, glossy. Orange-red. 0.5-0.6mm long, about 0.4mm wide.

WINGED PIGWEED

Goosefoot Family

Cycloloma atriplicifolium
Annual

Other common names: Tumbleweed.

Seed is circular in outline with a notch in the margin and groove running inward almost to the center. Lower face convex, with seed scar in the center and part of the pericarp usually persisting. Upper face flattened. Surface finely but distinctly granular, glossy or dull. Black. 1.8-2.1mm in diameter.

Seed with pericarp is circular in outline with wavy, winged margin. Pericarp is reddish-brown, papery, and its winged margin curved upward giving the appearance of a shallow dish. Five veins or ridges run from the hilum to slightly beyond the margin. 2.5-3.0mm in diameter.

COMMON YARROW

Composite Family

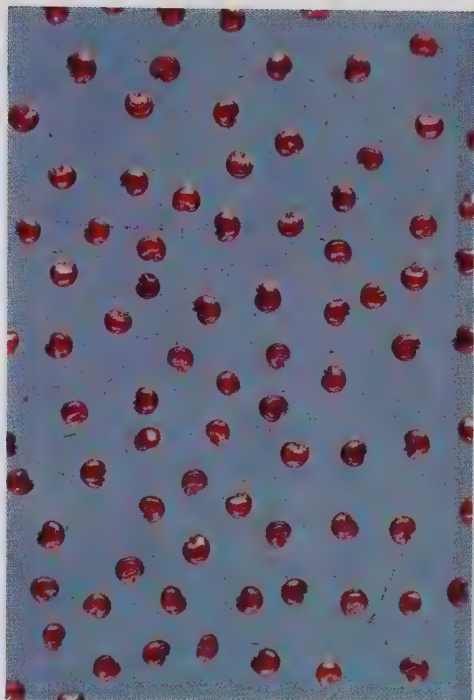
Achillea millefolium
Perennial

Other common names: Milfoil, Thousand-Leaf Sanguinary, Bloodwort, Soldier's Woundwort, Nosebleed Weed.

Elongated, widest near the apex and gradually tapered to truncate base. One margin frequently straight and the other convex. Apex truncate or notched and with a blunt style remnant in the center. In edge view, seed often curved. Seed papery thin with membraneous covering; margins winged. Margins silvery or tan, with reddish or purplish center visible through the covering. Seed scar oval. 1.7-2.5mm long, 0.7-0.9mm wide.



Water Hemp 5.8X
Acnidia altissima



Carpetweed 5.8X
Molluga verticillata



Winged Pigweed 5.8X
Cycloloma atriplicifolium



Common Yarrow 5.8X
Achillea millefolium

Chenopodium hybridum var. *gigantospermum*
Annual

Other common names: Goosefoot.

Mostly circular in outline but occasionally obovate. Lens-shaped in cross section with both faces highly convex. Margin notched at the hilum with groove running inward. Surface slightly roughened but glossy. Black. 1.5-2.0mm in diameter.

Seed may be enclosed in a tan, membranous pericarp which has a honeycomb or network appearance. Pericarp gives seed a tan appearance but is thin enough for the black color of the seed to be evident. Some seeds may still be enclosed in a five-parted perianth but it is generally removed in handling. The individual parts of the perianth are not ridged as with Common Lambsquarters.

COMMON LAMBSQUARTERS

Goosefoot Family

Chenopodium album
Annual

Other common names: White Goosefoot, Pigweed, Mealweed, Lambsquarters, Meldweed, Fat Hen, Frostbite, Baconweed.

Circular to obovate in outline. Lens-shaped in cross section but with one side usually visibly flattened. Margin notched at the hilum with a groove running inward. Surface slightly roughened but glossy. Black. 1.2-1.6mm in diameter.

Seed may be enclosed in a greyish or tan, membranous, granular pericarp through which the black color of the seed is evident. Some seeds may still be enclosed in a five-parted perianth, each part with a central, longitudinal ridge. Perianth is usually removed in handling.

KOCHIA

Goosefoot Family

Kochia scoparia
Annual

Other common names: Summer Cypress, Belvedere, Mexican Fireweed, Fireball, Burning Bush.

Triangular or sector-shaped in outline with apex rounded; flattened. Base a blunt point. Both faces concave with a narrow groove running through the base. Surface dull, granular. Greenish-black to black. 1.8-2.1mm long, 1.2-1.5mm wide.

RUSSIAN THISTLE

Goosefoot Family

Salsola kali var. *tenuifolia*
Annual

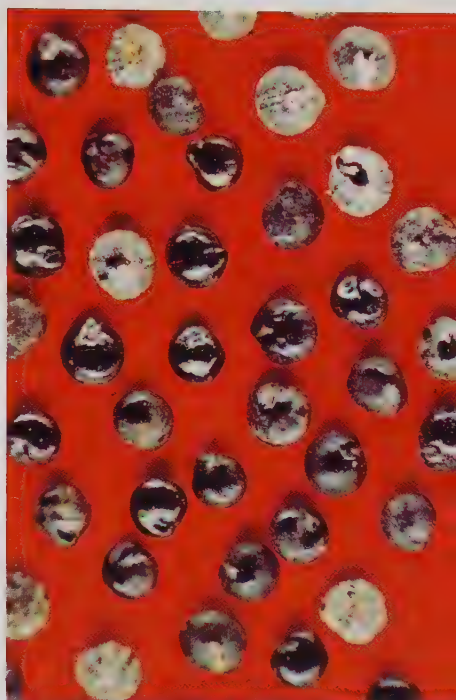
Other common names: Russian Cactus, Russian Tumbleweed, Tumbleweed, Common Saltwort, Tumbling Thistle, Prickly Glasswort, Wind Witch.

Conical in outline with a broad apex and tapered to a truncate base. Apex concave and with a short, central protuberance. Seed coat transparent and the embryo is in the form of two coils, one inside the other. The embryo is dark green in the center, becomes a lighter green toward the outside, and the outer rib is yellow. 1.8-2.2mm long, 1.4-1.6mm wide.



Maple Leaf Goosefoot 5.8X

Chenopodium hybridum var. *gigantospermum*



Common Lambsquarters 5.8X

Chenopodium alba



Kochia 5.8X

Kochia scoparia



Russian Thistle 5.8X

Salsola kali var. *tenuifolia*

COMMON CHICKWEED

Pink Family

Stellaria media
Annual

Other common names: Starweed, Satin Flower, Starwort, Tongue Grass, Winter Weed, Bird Weed, Chickweed, Bindweed.

Roughly circular in outline with slightly elongated base and part of the margins sometimes angular. Flattened in cross section with both faces slightly convex. Surface covered with curved rows of short, rounded tubercles which are relatively large for the size of the seed. Base slightly notched and a deep groove runs inward from the seed scar on both faces. Greyish-brown to reddish-brown. 1.1-1.3mm long, 1.0-1.2mm wide.

MOUSE EAR CHICKWEED

Pink Family

Cerastium vulgatum
Perennial

Other common names: Mouse Ear, Small Chickweed, Common Mouse Ear Chickweed.

Shape variable but usually circular or roughly sector-shaped; margins sometimes angular. Flattened. Surface covered with sparse, short, rounded tubercles arranged in rows on the upper part of the seed but with a less definite pattern near the base. Base notched with a groove running inward for a short distance and with a thin, white seed stalk remnant frequently attached. Reddish-brown. 0.5-0.8mm long, 0.5-0.7mm wide.

CORN SPURRY

Pink Family

Spergula arvensis
Annual or Winter Annual

Other common names: Spurry, Pickpurse, Sandweed, Yarr, Devil's Gut.

Circular or almost circular in outline; thickly lens-shaped in cross section appearing as if two turtle shells had been placed together. Margin winged and with one small notch. Surface dull, roughened. Greyish-black to black, the margin usually a light brown. 1.1-1.7mm in diameter.

COMMON PURSLANE

Purslane Family

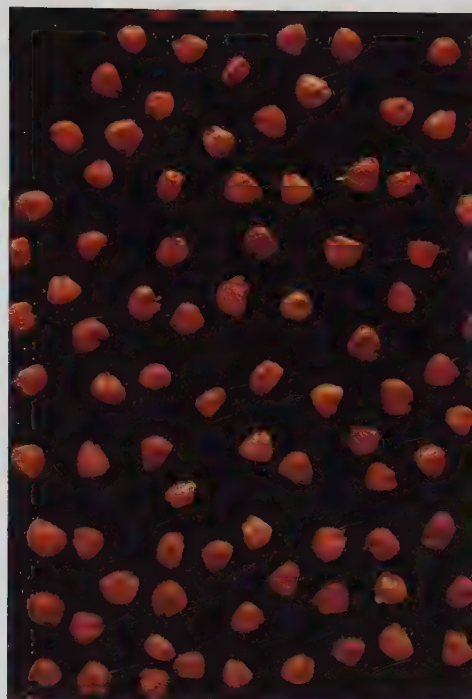
Portulaca oleracea
Annual

Other common names: Pussley, Pursley, Wild Portulaca, Duckweed, Portulaca, Purslane.

Roughly triangular or obovate in outline, flattened with each face slightly convex. Surface covered with short, rounded tubercles arranged in curved rows. Seed scar oval, yellowish, and located on one margin immediately above the extreme base. On each face a broad groove runs from the seed scar inward. Black. 0.6-0.9mm long, 0.4-0.6mm wide.



Common Chickweed 5.8X
Stellaria media



Mouse Ear Chickweed 5.8X
Cerastium vulgatum



Corn Spurry 5.8X
Spergula arvensis



Common Purslane 5.8X
Portulaca oleraceae

EASTERN WHORLED MILKWEED

Milkweed Family

Asclepias verticillata
Perennial

Other common names: Eastern Narrow-Leaved Milkweed, Whorl-Leaf Milkweed, Whorled Milkweed.

Ovate in outline with truncate, usually slightly concave apex, its width about one-fourth to one-fifth the widest part of the seed. Highly flattened, with wide, thin, winged margins. One side with central, longitudinal nerve running from apex into a dark, reddish-brown, club-shaped, depressed area which extends for about three-fourths the length of the seed. Margins wrinkled and separated from the central, granular or finely wrinkled portion by a deep furrow. Margins and central portion both reddish-brown in color but club-shaped area is darkened colored. Seed is tipped with parachute of soft hairs which is easily broken off and usually absent. 5.0-5.5mm long, 3.0-3.5mm wide.

COMMON MILKWEED

Milkweed Family

Asclepias syriaca
Perennial

Other common names: Silkweed, Cottonweed, Milkweed.

Ovate in outline with wide, truncate tip, which is about one-half as wide as the widest part of the seed. Highly flattened, center slightly convex, margins thin, widely winged. One side has central, longitudinal nerve starting at the apex and running about three-fourths the length of the seed. Surface wrinkled, margins tan or light brown with darker central portion which is frequently a reddish-brown. Seed is tipped with parachute of soft hairs which is easily broken off and generally absent. 8.0-10.0mm long, 4.4-5.5mm wide.

PRAIRIE DOCK

Composite Family

Silphium terebinthinaceum
Perennial

Other common names: Prairie Burdock, Rosin Plant.

Broadly obovate in outline; highly flattened. Margins winged, sometimes lighter colored and usually curved upward giving the seed a "dished" appearance. Apex notched and with two teeth, one on each side of the notch. Teeth easily broken off and frequently absent. Base rounded and with a fine, short point. Surface covered with short, fine, whitish hairs and curved, longitudinal ridges. Greyish-brown. 8.0-13.0mm long, 4.0-7.0mm wide.

TEASEL

Teasel Family

Dipsacus sylvestris
Biennial

Other common names: Water Thistle, Card Thistle, Gipsy Combs, Venus Cup, Card Teasel.

Rectangular or oblong in outline; about square in cross section. Each side or face usually with one broad rib on each corner and one in the center. Surface with short, fine hairs which lie close to the surface. Hilum oval, depressed. Apex depressed with raised area in the center from which fine ridges radiate to the margins. Greyish-brown. 3.0-4.0mm long, 0.9-1.2mm wide.



Eastern Whorled Milkweed 3.6X
Asclepias verticillata



Common Milkweed 3.6X
Asclepias syriaca



Prairie Dock 3.6X
Silphium terebinthinaceum



Teasel 3.6X
Dipsacus sylvestris

COMMON RAGWEED

Composite Family

Ambrosia artemisiifolia
Annual

Other common names: Roman Wormweed, Hogweed, Annual Ragweed, Small Ragweed, Wild Tansy, Hayfever Weed, Bitterweed, Hayweed, Carrotweed, Stammerwort, Blackweed.

Seed unit woody, urn-shaped; apex with long, spiny, central protuberance which is surrounded by a circle of five to eight shorter, slender projections that extend downward as weak ribs. Inter-rib spaces roughened by small protuberances. Seed unit convexly tapered from slightly below the crown to the base. Protuberances slenderer and sharper than those of Giant Ragweed. Yellowish-brown to reddish-brown but sometimes with a bluish color near the crown. 3.0-4.0mm long, 1.8-2.5mm wide.

GIANT RAGWEED

Composite Family

Ambrosia trifida
Annual

Other common names: Kinghead, Horse Cane, Horseweed, Greater Ragweed, Great Ragweed, Big Ragweed, Buffaloweed, Tall Ambrosia, Crownweed, Wild Hemp, Big Bitterweed, Tall Ragweed, Kingweed, Bitterweed.

Seed unit woody, urn-shaped; apex with strong central protuberance which is surrounded by a circle of five or six lesser protuberances that extend downward as rounded but sometimes weak ribs. Inter-rib spaces may have a lesser ridge, be wrinkled, or roughened in some manner. Seed unit convexly tapered from near the crown to the base. Protuberances thicker and more blunt than those of Common Ragweed. Greyish-brown, yellowish-brown or brown. 6.0-12.0mm long, 4.0-6.0mm wide.

SALTBUSH

Goosefoot Family

Atriplex argentea
Annual

Other common names: Orache.

Fan-shaped in outline. Flattened with upper one-fourth of the seed thin; apex wavy or notched. Surface roughened and with several prominent, longitudinal veins from which numerous, less distinct veins arise and branch off across the seed. Seed scar depressed, oval to circular. Tan to reddish-brown. 3.0-4.0mm long, 2.5-4.0mm wide.

SUNFLOWER

Composite Family

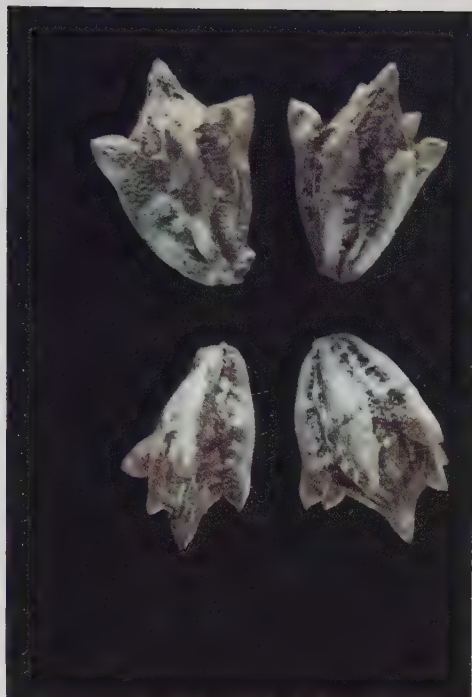
Helianthus annuus
Annual

Other common names: Common Sunflower, Wild Sunflower.

Obovate or triangular in outline. Elliptical in cross section. Apex with rounded corners and short, stout, style remnant centrally attached. Surface with faint, longitudinal lines, covered with fine hairs which are particularly evident at the apex, but many may be broken off in handling. Margins of the base smooth. White, greyish, or brown with black mottling or a black zigzag pattern. 5.5-8.0mm long, 2.2-2.6mm wide.



Common Ragweed 3.6X
Ambrosia artemisiifolia



Giant Ragweed 3.6X
Ambrosia trifida



Salt Bush 3.6X
Atriplex argentea



Sunflower 3.6X
Helianthus annuus

Cirsium arvense
Perennial

Other common names: Creeping Thistle, Small-Flowered Thistle, Perennial Thistle, Cursed Thistle, Soft Field Thistle, Green Thistle.

Elongated; broadest above the middle, gradually tapered to a narrow, truncate, frequently oblique base and upward to an oblique, slightly depressed, truncate apex. The apex is encircled by a narrow, prominently rimmed collar below which is a constricted band. In lateral view, some seeds curved. Apex usually bears a slender remnant of the style and tipped with a parachute of bristles which is easily broken off and almost always absent. Oval in cross section, sometimes becoming four-angled near the base. Surface smooth, dull, brown. 2.5-3.0mm long, 0.8-1.0mm wide.

FLODMAN THISTLE

Composite Family

Cirsium flodmani
Biennial or Perennial

Other common names: Prairie Thistle, Pasture Thistle.

Elongated; broadest above the middle, tapered to a broad, truncate base, and upward to an oblique, depressed, truncate apex which bears a stout, conical style remnant. Apex is tipped with a parachute of bristles which is easily broken off and almost always absent. Apex rim is slightly crinkled or serrated. Olive-green, streaked with dark brown or black, and a broad, yellow band encircles the apex. Surface smooth, dull or with slight sheen. 3.0-4.0mm long, 1.5-2.0mm wide.

BULL THISTLE

Composite Family

Cirsium vulgare
Biennial

Other common names: Spear Thistle, Bur Thistle, Plume Thistle, Lance-Leaved Thistle.

Elongated; broadest above the middle, gradually tapered to a narrow, truncate base and upward to an oblique, slightly depressed, truncate apex which bears a slender, frequently inconspicuous style remnant. Oval in cross section. Apex is tipped with a parachute of bristles which is easily broken off and almost always absent. Yellowish-brown, streaked with black or purple and with narrow, yellow band at apex. Surface smooth, dull or with a slight sheen. 3.5-4.0mm long, 1.2-1.7mm wide.

TALL THISTLE

Composite Family

Cirsium altissimum
Biennial

Other common names: Field Thistle, Pasture Thistle, Roadside Thistle, Horse Thistle.

Elongated; broadest above the middle, gradually tapered to a narrow, truncate base and upward to an oblique, truncate, slightly depressed apex which usually bears a stout, conical style remnant. One side or margin usually straight, the other curved. In lateral view, some seeds curved. Apex tipped with a parachute of bristles which is easily broken in handling and is almost always absent. Yellowish-brown, faintly streaked with black or purple, and a broad, yellow band encircles the apex. Dull or with a slight sheen, smooth. 4.0-5.0mm long, 1.7-2.2mm wide.



Canada Thistle 3.6X
Cirsium arvense



Flodman Thistle 3.6X
Cirsium flodmani



Bull Thistle 3.6X
Cirsium vulgare



Tall Thistle 3.6X
Cirsium altissimum

OXEYE DAISY

Composite Family

Chrysanthemum leucanthemum
Perennial

Other common names: Field Daisy, White Daisy, White Weed, Marguerite, Midsummer Daisy, Poorland Flower, Moon-Penny, Poverty Weed.

Narrowly obovate in outline; usually one margin straight and the other curved. Circular to oval in cross section. Apex truncate with short, blunt style remnant; base truncate. Surface with eight to ten longitudinal, yellowish-white to silvery ribs; interspaces reddish-black and frequently covered with white spots or yellowish covering. 1.5-2.0 long, 0.6-0.9mm wide.

CHICORY

Composite Family

Cichorium intybus
Perennial

Other common names: Coffee Weed, Blue Daisy, Wild Succory, Chicory, Blue Sailors, Blue Dandelion, Wild Chicory, Bunk.

Roughly peg-shaped; widest at the truncate apex and tapered to a truncate base. Apex tipped with a crown of short, bristle-like scales. In lateral view, some seeds curved. Oval to three or five-sided in cross section. Surface longitudinally ridged. Greyish or light brown with black mottling in mature seeds. 2.2-3.0mm long, 0.9-1.5mm wide.

DOGBANE

Milkweed Family

Apocynum cannabinum
Perennial

Other common names: Indian Hemp, Hemp Dogbane, Indian Physic, Wild Cotton Milkweed, Smooth Milkweed, Spreading Dogbane, Dogbane Milkweed, American Hemp, Choctaw Root, Dropsy Root, Amy Root, Bowman's Root, Rheumatism Weed, Black Indian Hemp, Wandering Milkweed, Honey Bloom, Milk Ipecac.

Highly elongated, narrow, flattened. Broadest at or near the middle, slightly tapered to a truncate, wavy apex and to a narrow, very thin base. Usually elliptical in cross section. Apex bears tuft of soft, silky bristles which is easily broken off and seldom present. Surface granular, one face has a fine, white, longitudinal line running through the middle one-third of the seed and the other is sometimes longitudinally ribbed. When tuft is absent, the oval, light colored, slightly depressed apex is evident. Brown to mahogany-red. 4.5-6.0mm long, 0.8-1.0mm wide.

YELLOW NUTSEDGE

Sedge Family

Cyperus esculentus
Perennial

Other common names: Yellow Nutgrass, Chufa, Rush Nut, Earth Almond, Nut Rush, Galingdale, Edible Galingdale, Yellow Galingdale, Northern Nutgrass, Coco, Coco Sedge, Nut Sedge.

Narrowly obovate in outline; broadest near the apex and gradually tapered to narrow, rounded base. Triangular in cross section; angles blunt, rounded, and the sides distinctly concave giving the appearance of a three-toothed cog. A style remnant usually remains attached to the apex and the surface is finely pebbled. Light brown to yellowish-brown. 1.1-1.5mm long, 0.5-0.7mm wide.



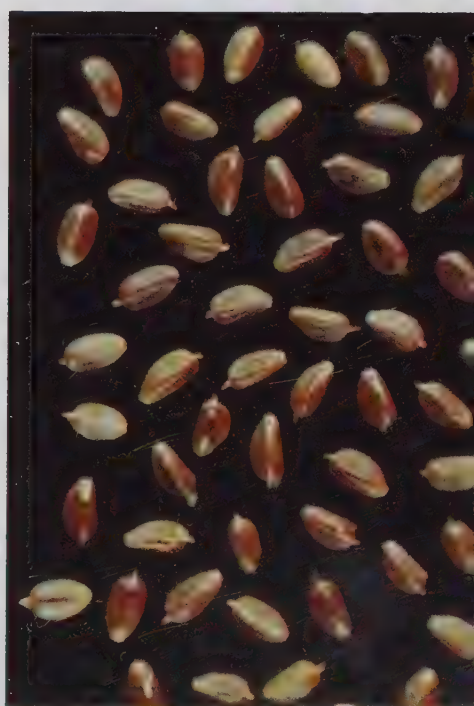
Oxeye Daisy 5.8X
Chrysanthemum leucanthemum



Chicory 5.8X
Cichorium intybus



Dogbane 5.8X
Apocynum cannabinum



Yellow Nutsedge 5.8X
Cyperus esculentus

RED SORREL

Buckwheat Family

Rumex acetosella
Perennial

Other common names: Sheep Sorrel, Field Sorrel, Sour Dock, Sheep Shower, Sourgrass, Little Sorrel, Common Sorrel, Sourweed, Horse Sorrel, Redtop Sorrel, Cow Sorrel, Redweed, Mountain Sorrel.

Broadly ovate in outline with bluntly pointed apex and slightly extended base. Triangular in cross section with all three sides about equal in width and the angles obtuse. Surface smooth and glossy but the perianth adheres tightly to the seed and frequently remains attached to part or all of the surface. The perianth is granular with a network of veins, reddish-brown to dark brown, and the veins are sometimes a lighter color. With the perianth attached, the seed is roughly oval shaped, the base slightly extended, the apex bluntly pointed, 1.2-1.5mm long, 0.9-1.2mm wide. The seed with the perianth removed is reddish-brown, 1.0-1.3mm long, 0.8-1.1mm wide.

PROSTRATE KNOTWEED

Buckwheat Family

Polygonum aviculare
Annual or Perennial

Other common names: Doorweed, Knotweed, Matgrass, Knotgrass, Pinkweed, Birdgrass, Stonegrass, Waygrass, Goosegrass.

Roughly ovate in outline; broadest about one-third the distance from the base and concavely tapered to a pointed apex. Triangular in cross section. Sides usually unequal in width, dull and roughened by tiny tubercles, slightly concave, angles smooth and glossy. Remnant of the perianth usually attached to the base. Reddish-brown to dark brown. 2.5-3.0mm long, 1.5-2.0mm wide.

WOOLLY CROTON

Spurge Family

Croton capitatus
Annual

Other common names: Goatweed, Hogwort.

Circular or oval in outline. Both faces convex but ventral side sometimes appears two-faced. Ventral side with a central, longitudinal ridge and a distinct angle or ridge along the margins. Seed scar circular, depressed, and surrounded by mass of tissue (caruncle). Chalaza conspicuous and elevated. Surface glossy but pebbled or granular. Dark tan to orange-brown. 4.0-5.0mm in diameter.

DANDELION

Composite Family

Taraxacum officinale
Perennial

Other common names: Blowball, Puffball, Cankerwort, Milk Witch, Yellow Gowan, Witch's Gowan, Doon-Head-Clock, Lion's Tooth.

Elongated, broadest above the middle, gradually tapered to a rounded base and to a rounded apex which terminates in a long, thin, ribbed awnlike projection tipped with a parachute of hairs. Parachute easily removed and seldom present; awn easily broken and usually only remnant remains. Seed frequently curved, oval in cross section, seed scar depressed. Surface with twelve to fifteen longitudinal ribs which are covered with short protuberances in lower part and long, stout, stiff spines in the upper one-half of the seed. Yellowish or golden-brown. 3.0-4.0mm long, 1.1-1.3mm wide.



Red Sorrel 5.8X
Rumex acetosella



Prostrate Knotweed 5.8X
Polygonum aviculare



Woolly Croton 5.8X
Croton capitatus



Dandelion 5.8X
Taraxacum officinale

COMMON MALLOW

Mallow Family

Malva neglecta
Annual or Biennial

Other common names: Cheeses, Running Mallow, Round Dock, Malice, Button Weed.

Kidney-shaped in outline, but margin with deep, narrow notch and the seed may appear as a notched circle. Surface finely roughened, dull, lighter colored near the notch. Sector-shaped in cross section. Reddish-brown. 1.3-1.8mm in diameter.

ROUGH CINQUEFOIL

Rose Family

Potentilla norvegica
Annual, Winter Annual, or Biennial

Other common names: Strawberry Weed, Barren Strawberry, Norway Cinquefoil, Tall Five Finger.

Half-moon to ear-shaped in outline. In cross section, both faces slightly convex, thickest at the outer margin and tapering toward the hilum margin. Surface covered by relatively broad, rounded, branched veins. Both the veins and interspaces tan or light brown. Seed scar depressed, oval. 0.8-1.0mm long, 0.6-0.7mm wide.

STINGING NETTLE

Nettle Family

Urtica dioica
Perennial

Other common names. Nettle, Slender Nettle, Tall Nettle, Great Nettle.

Ovate in outline with slightly extended, truncate base; apex broadly pointed and usually tipped with a short, dark stalk. Lens-shaped in cross section. Surface dull, slightly roughened. Greyish to yellowish-tan. 0.9-1.2mm long, 0.7-0.9mm wide.

SULFUR CINQUEFOIL

Rose Family

Potentilla recta
Perennial

Other common names: Rough-Fruited Cinquefoil, Upright Cinquefoil, Tormentil.

Half-moon or ear-shaped; both faces slightly convex. Margin winged. Surface covered with fine, papery, curved, branched ribs. Winged margin and veins tan, inter-vein spaces dark brown. 1.1-1.5mm long, 0.7-1.1mm wide.



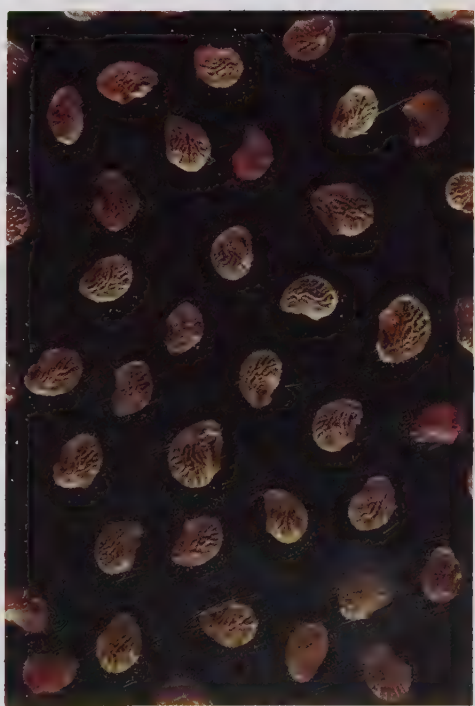
Common Mallow 5.8X
Malva reflexa



Rough Cinquefoil 5.8X
Potentilla norvegica



Stringing Nettle 5.8X
Urtica dioica



Sulfur Cinquefoil 5.8X
Potentilla recta

Dioda téres
Annual

Other common names: Buttonweed, Rough Buttonweed,

Broadly obovate; plano-convex. Apex truncate and bears a blunt calyx remnant or sometimes a few calyx teeth. Dorsal side convex, sometimes with a few faint ribs, sparsely covered with hairs which become much longer toward the apex. Ventral side flat, with a "raw, damaged appearance" and forked groove. Light brown to greyish-brown. 3.0-4.2mm long, 2.3-2.9mm wide.

BEDSTRAW

Madder Family

Galium aparine
Annual

Other common names: Cleavers, Catchweed, Cleaver Wort, Spring Cleavers, Goose Grass, Scratch Grass, Grip Grass, Sweethearts, Cling Rascal.

Circular to kidney-shaped in outline; oval in cross section. Surface densely covered with stiff, hooked spines, interspersed with tubercles. Seed scar depressed, one end greatly enlarged and frequently having the shape of a bowling pin or club. Yellowish-brown to greyish-brown. 2.0-3.0mm in diameter.

JIMSON WEED

Nightshade Family

Datura stramonium
Annual

Other common names: Stinkwort, Thorn Apple, Trumpet Plant, Jamestown Weed, Mad Apple, Devil's Trumpet, Stinkweed, Jamestown Lily, Devil's Apple, Dewtry.

Mostly kidney-shaped in outline; flattened and narrowly sector-shaped in cross section. Surface with broad, shallow wrinkles and a network of thick veins and small, shallow interspaces. Hilum triangular, tan to brown. Black. 3.0-3.8mm long, 2.5-3.0mm wide.

BUFFALO BUR

Nightshade Family

Solanum rostratum
Annual

Other common names: Mexican Thistle, Colorado Bur, Texas Sandbur, Prickly Nightshade, Beaked Nightshade, Kansas Thistle, Sand Bur, Texas Thistle.

Roughly obovate or ear-shaped in outline with wavy margin and a right angled notch at the hilum. Sector-shaped in cross section. Surface broadly wrinkled and with a dense network of thin veins; interspaces small but deep. Hilum a deep circular cavity with a rounded edge and the same color as the seed. Black. 2.5-3.0mm long, 2.0-2.5mm wide.



Poor Joe 3.6X
Dioda teres



Bedstraw 3.6X
Galium aparine



Jimson Weed 3.6X
Datura stramonium



Buffalo Bur 3.6X
Solanum rostratum

CLAMMY GROUND CHERRY

Nightshade Family

Physalis heterophylla
Perennial

Other common names: Lantern Weed, Bladder Cherry, Cherry Tomato, Ground Cherry, Husk Tomato.

Kidney or ear-shaped in outline; flattened, both faces slightly convex. Surface covered with thick, wavy, translucent veins and comparatively small, shallow interspaces. Hilum area slightly depressed, narrowly ovate. Deep yellow. 2.0-2.5mm long, 1.7-2.0mm wide. (Features too similar to distinguish from Prairie Ground Cherry (*P. lanceolata*)).

CAROLINA HORSE NETTLE

Nightshade Family

Solanum carolinense
Perennial

Other common names: Horse Nettle, Sand Brier, Bull Nettle, Carolina Nettle, Wild Tomato, Apple-of-Sodom, Bull Thistle, Tread-Soft.

Obovate to oval in outline; the base sometimes slightly extended and truncate. Flattened; both faces slightly convex. Surface with "varnished" appearance; frequently with faint curved veins near the margin but rest of the surface with fine, broken veins providing no definite pattern and giving a granular appearance. Hilum depressed and narrowly ovate. Pale to deep yellow but immature seeds orangish to reddish-brown. 2.0-2.4mm long, 1.5-2.0mm wide.

BLACK NIGHTSHADE

Nightshade Family

Solanum nigrum
Annual

Other common names: Garden Nightshade, Poison Berry, Deadly Nightshade, Duscle, Hound's Berry, Stubble Berry.

Usually obovate in outline with slightly extended, narrow base which is frequently oblique and truncate. Flattened; both faces slightly convex. Slightly tapered from the apex to the base which terminates in a thin edge. Surface covered with a network of veins which have a whitish cast and form a definite pattern. Hilum a closed slit. Pale yellow to deep yellow. 1.0-1.6mm long, 0.9-1.3mm wide.

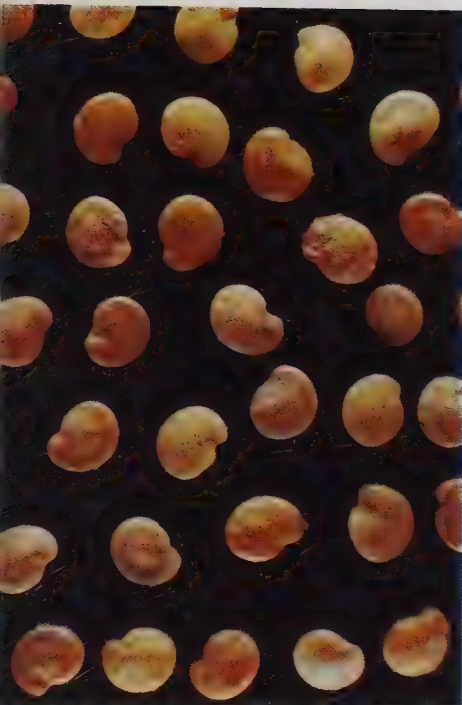
BITTER NIGHTSHADE

Nightshade Family

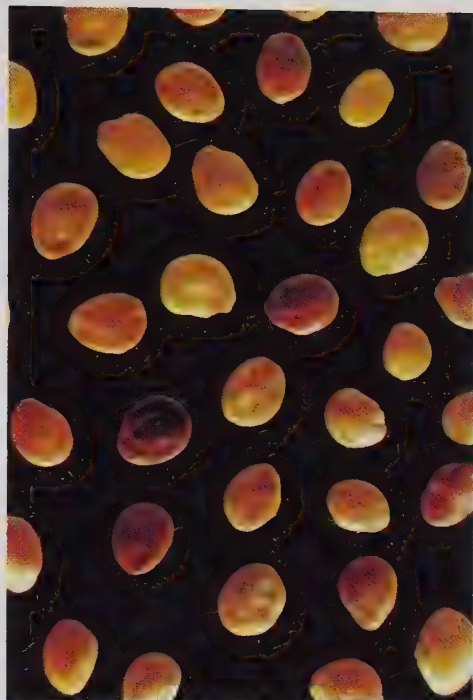
Solanum dulcamara
Perennial

Other common names: Climbing Nightshade, Bittersweet, Blue Bindweed, Fellenwort, Woody Nightshade, Poison Berry, European Bittersweet, Blue Nightshade, Scarlet Berry.

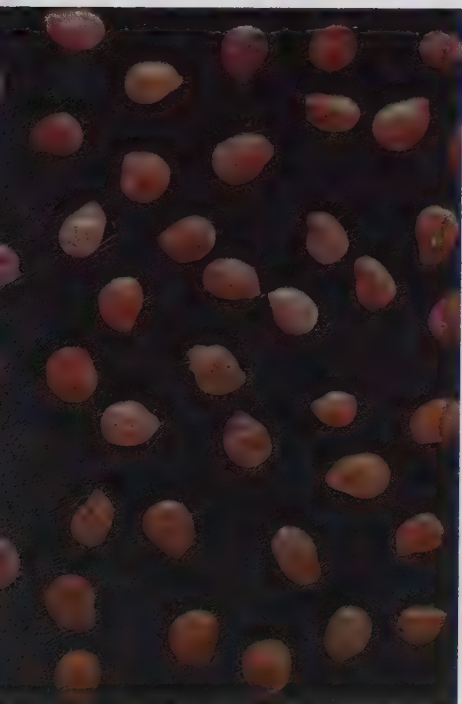
Obovate or kidney-shaped in outline with a short groove or indentation in the face near the hilum area. Flattened; face slightly convex, slightly tapered in thickness from the apex to the base but the base does not terminate in a thin edge. Surface with a network of fine veins which form a definite pattern, have a whitish cast, and a translucent appearance. Hilum a closed slit. Pale yellow. 2.0-2.6mm long, 1.7-2.0mm wide.



Clammy Ground Cherry 3.6X
Physalis heterophylla



Carolina Horse Nettle 3.6X
Solanum carolinense



Black Nightshade 3.6X
Solanum nigrum



Bitter Nightshade 3.6X
Solanum dulcamara

PROSTRATE VERVAIN

Vervain Family

Verbena bracteata
Annual or Perennial

Other common names: Bracted Vervain, Large Bracted Vervain.

Oblong in outline; about the same width throughout except usually slightly wider at the base. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where they join. Both ends of the seed usually bluntly rounded. Dorsal side usually with five longitudinal ribs, and occasionally four, which are joined by transverse ribs in the upper one-half of the seed forming a prominent network of veins. Inter-rib spaces large, shallow, usually flared or wider at the base. Seed scar oval, oblique, white. Golden-brown to reddish-brown. 2.0-2.4mm long, 0.7-0.9mm wide.

BLUE VERVAIN

Vervain Family

Verbena hastata
Perennial

Other common names: Blue Verbena, False Vervain, Simpler's Joy, Wild Hyssop, Ironweed, Purvain.

Oblong in outline; about the same width throughout. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where they join. Both ends of the seed usually bluntly rounded. Dorsal side usually with three to five weak but rather broad-based longitudinal ribs with a few weak transverse ribs which frequently occur only between the margins and the first adjacent longitudinal rib. Transverse ribs usually occur only in the upper one-fourth to one-third of the seed. Seed scar oval, oblique, white. Dark reddish-brown to almost black. 1.7-2.0mm long, 0.7-0.9mm wide.

HOARY VERVAIN

Vervain Family

Verbena stricta
Perennial

Other common names: Wooly Vervain, Hoary Verbena, Mullien-Leaved Vervain, Verbena.

Oblong in outline; about the same width throughout. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where they join. Both ends of the seed usually bluntly rounded. Dorsal side usually with five and occasionally six longitudinal ribs which run part way or the entire length of the seed and are joined by transverse ribs in the upper one-fourth to one-third of the seed. The central veins usually are joined by transverse ribs only in the upper one-fourth of the seed. Usually about the same width throughout the seed. Seed scar oval, oblique, white. Reddish-brown. 2.4-3.1mm long, 0.6-0.8mm wide.

WHITE VERVAIN

Vervain Family

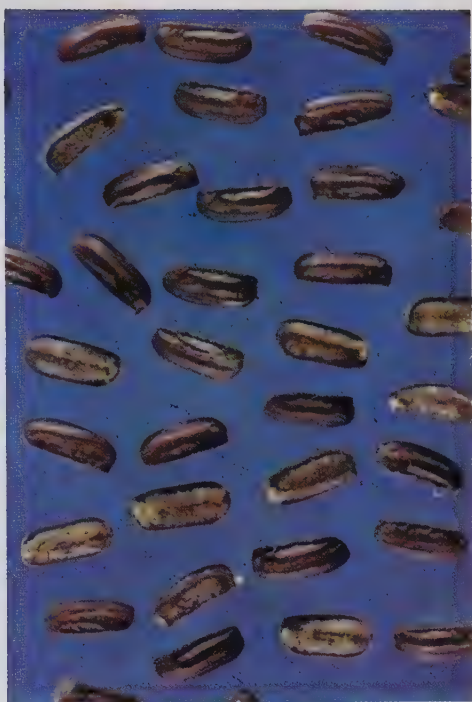
Verbena urticifolia
Perennial

Other common names: Nettle-Leaved Vervain, Nettle-Leaved Verbena.

Oblong in outline; frequently slightly wider at the apex and gradually tapered to the base. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where joined. Dorsal side usually with three and occasionally five fine, weak longitudinal ribs which are joined by a few weak transverse ridges that frequently occur only between the margin and first rib in the upper one-third of the seed. Seed scar oval, oblique, white. Brown to reddish-brown. 1.5-1.8mm long, 0.5-0.6mm wide.



Prostrate Vervain 5.8X
Verbena bracteata



Blue Vervain 5.8X
Verbena hastata



Hoary Vervain 5.8X
Verbena stricta



White Vervain 5.8X
Verbena officinalis

BRACTED PLANTAIN

Plantain Family

Plantago arlstata
Annual or Winter Annual

Other common names: Bottlebrush Plantain, Bristly Buckhorn, Western Buckhorn, Western Ripple Grass, Rat-Tail Plantain, Clover Choker.

Oval to ovate in outline; dorsal side convex with a shallow, transverse groove in the middle; ventral side broadly concave with two brown, white-margined seed scars in the center and alternating elliptical bands of brown, white, and brown. Surface dull, granular. Brown to reddish-brown. 2.5-3.0mm long, 1.3-1.5mm wide.

BUCKHORN PLANTAIN

Plantain Family

Plantago lanceolata
Perennial

Other common names: Ribbed Plantain, Narrow-Leaved Plantain, Buckhorn, Rib Grass, English Plantain, Ribwort, Rat-Tail, Ripple Grass, Buck Plantain, Black Jacks.

Usually oval to ovate but some seeds are about oblong in outline. Dorsal side convex; ventral side has a narrow, deep groove which runs through one end of the seed and is bordered on the sides and the other end by broad, round, inturned margins. Dark colored, depressed hilum lies in the center of the groove. Light brown to dark brown with a broad, yellowish, longitudinal stripe in the middle of the dorsal side. Glossy. 2.3-2.6mm long, 1.0-1.3mm wide.

BROAD LEAF PLANTAIN

Plantain Family

Plantago major
Perennial

Other common names: Common Plantain, Dooryard Plantain, English Plantain, Major Plantain, White Man's Foot, Waybread, Greater Plantain, Birdseed Plantain.

Shape highly variable, the shape dependent upon the number of seeds in the capsule; frequently roughly elliptical or oval with angular margins. Dorsal side convex but not as much so as the ventral side. Surface appears granular or pebbled but under magnification wavy ridges can be seen on the dorsal side and radiating from the hilum on the ventral side. White seed scar located about in the middle of the ventral side. Light to dark brown with a broad, lighter colored, longitudinal stripe frequently present on the dorsal side. 1.1-1.5mm long, 0.6-0.8mm wide.

BLACK SEED PLANTAIN

Plantain Family

Plantago rugelii
Perennial

Other common names: Purple-Stemmed Plantain, Red-Stemmed Plantain, Pale Plantain, Rugel's Plantain, Broadleaved Plantain, Silk Plant, White Man's Foot.

Shape highly variable, the shape dependent on the number of seeds in the capsule; frequently roughly elliptical or oval with angular margins. Dorsal side convex but not as much so as the ventral side. Surface granular or pebbled. White seed scar located in about the center of the ventral side. Black or dark brown with a broad, lighter colored, longitudinal band down the middle of the dorsal side. 2.0-2.6mm long, 0.9-1.1mm wide.



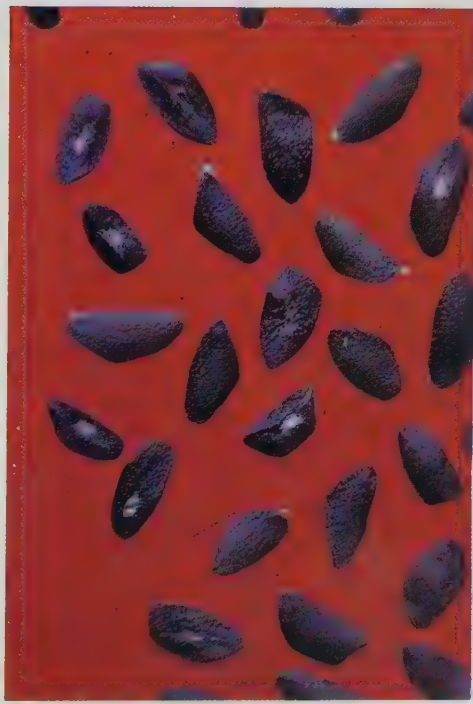
Bracted Plantain 5.8X
Plantago aristata



Buckhorn Plantain 5.8X
Plantago lanceolata



Broad Leaf Plantain 5.8X
Plantago major



Black Seed Plantain 5.8X
Plantago rugelii

SMALL FLOWER BUTTERCUP

Crowfoot Family

Ranunculus abortivus
Biennial

Other common names: Small Flowered Crowfoot, Kidney-Leaf Crowfoot, Kidney-Leaf Buttercup, Abortive Buttercup, Smooth Leaved Crowfoot.

Broadly obovate in outline, frequently with slightly extended base, and one edge or margin more highly curved than the other. Narrowly elliptical in cross section. Margins winged with one edge or margin of the seed more widely winged than the other. A small hooklike extension originates from the margin slightly below the extreme apex. Surface dull, pitted. Yellowish-brown. 1.3-1.7mm long, 1.1-1.3mm wide.

TALL BUTTERCUP

Crowfoot Family

Ranunculus acris
Perennial

Other common names: Meadow Buttercup, Common Buttercup, Tall Crowfoot, Kingcup, Blister Flower, Butter Flower, Gold Cup, Butter Rose, Tall Field Buttercup.

Broadly obovate in outline, frequently with slightly extended base, one edge or margin more highly curved than the other. Narrowly elliptical in cross section. Margins winged with one edge or margin of the seed more widely winged than the other. A prominent hooklike extension originates from the margin slightly below the extreme apex. Surface finely pitted. Light brown to dark brown but more frequently the latter. 2.2-3.3mm long, 2.0-2.6mm wide.

BULBOUS BUTTERCUP

Crowfoot Family

Ranunculus bulbosus
Perennial

Other common names: Bulbous Crowfoot, Yellow Weed, Blister Flower.

Broadly obovate in outline, frequently with slightly extended base. Narrowly elliptical in cross section. Center of the seed dark brown to reddish-brown and separated from the prominent, yellowish margins by a fine ridge. A prominent hooklike extension originates from the margin slightly below the extreme apex. Surface granular. 3.0-3.5mm long, 2.3-2.8mm wide.

CELERY-LEAF BUTTERCUP

Crowfoot Family

Ranunculus sceleratus
Annual

Other common names: Cursed Buttercup, Cursed Crowfoot, Celery-Leaf Crowfoot, Ditch Crowfoot, Bog Buttercup.

Obovate in outline; one margin more highly curved than the other. Usually the margins are not winged but occasionally a minute wing may occur on the lesser curved margin. In edge view, a central seam is evident along the margins. Each face has a raised, usually lighter colored, granular, irregular border running along the margins. The center of each face is convex and usually covered with a few transverse wrinkles. A small, usually straight but occasionally slightly curved point or extension originates from the margin slightly below the extreme apex. Tan to yellowish-brown. 0.9-1.1mm long, 0.7-0.9 wide.



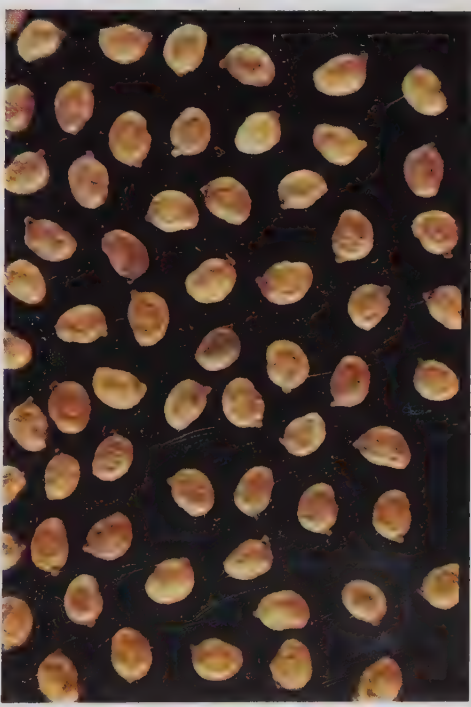
Small Flower Buttercup 5.8X
Ranunculus abortivus



Tall Buttercup 5.8X
Ranunculus acris



Bulbous Buttercup 5.8X
Ranunculus bulbosus



Celery Leaf Buttercup 5.8X
Ranunculus sceleratus

YELLOW TOADFLAX

Figwort Family

Linaria vulgaris
Perennial

Other common names: Wild Snapdragon, Butter and Eggs, Ramsted, Flaxweed, Impudent Lawyer, Eggs and Bacon, Jacob's Ladder.

About circular in outline; flattened, center slightly convex and with notched or wavy, broadly winged margin. Center of the seed covered with warty tubercles and the seed in general has a "leathery" appearance. Brown to black. 1.5-2.5mm in diameter.

COMMON MULLEIN

Figwort Family

Verbascum thapsus
Biennial

Other common names: Great Mullein, Mullein Dock, Aaron's Rod, Flannel Leaf, Jacob's Staff, Velvet Dock, Flatwort, Velvet Plant, Flannel Plant, Feltwort, Blanket Leaf, Hedge Taper, Candle Wick, Big Taper, Torches.

Trapezoidal in outline; widest at the apex and gradually tapered to a broad but usually slightly rounded base. Apex usually truncate but occasionally slightly curved. Surface highly roughened by wavy longitudinal grooves and ribs. A very short seedstalk remnant frequently remains attached to the base. Light brown and darker near the base or entire seed dark brown. 0.6-0.9mm long, 0.4-0.5mm wide.

MOTH MULLEIN

Figwort Family

Verbascum blattaria
Biennial

Other common names: None in general usage.

Trapezoidal in outline; widest at the apex and gradually tapered to a broad but usually slightly rounded base. Apex usually truncate but occasionally is slightly curved. Surface highly roughened by deep, wavy, longitudinal grooves and vertical rows of deep elliptical pits. A very short seed stalk remnant frequently remains attached to the base. Brown to black. 0.6-0.9mm long, 0.4-0.5mm wide.

BALL MUSTARD

Mustard Family

Neslia paniculata
Annual or Biennial

Other common names: Yellow Weed, Neslia.

Seed unit in crop seeds may be the fruit or the seed.

Fruit oval or cabbage-shaped in outline; oval in cross section. Apex with tiny, circular area; base slightly extended, truncate, hilum square or almost circular. Both faces convex and form a prominently ridged edge where they join. Surface with a prominent network of veins and large, shallow interspaces. Grey to greyish-brown. 2.2-2.5mm from hilum to apex, 2.5-2.8mm across.

Seed oval in outline; radicle thick, forms prominently bulged rib, tip frequently extends slightly beyond the cotyledons and lies on-center. Two grooves, one on each side of the radicle, extend to the apex. Surface slightly wrinkled. Yellow to yellowish-brown with a distinct, dark, reddish-brown circular spot on the cotyledon side of the base. 1.9-2.2mm long, 1.0-1.3mm wide.



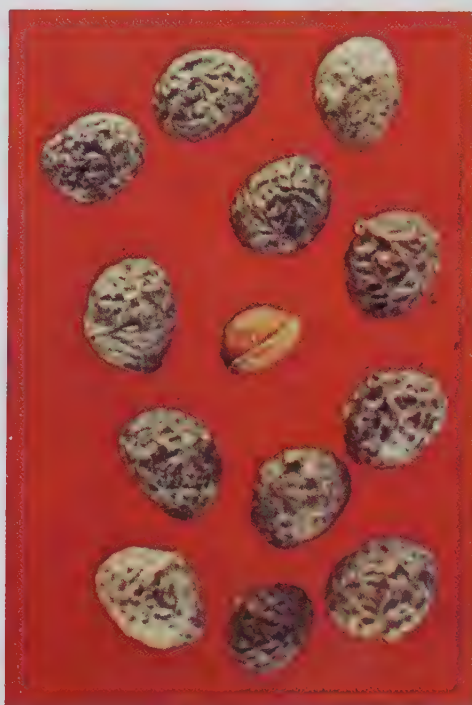
Yellow Toad Flax 5.8X
Linaria vulgaris



Common Mullein 5.8X
Verbascum thapsus



Moth Mullein 5.8X
Verbascum blattaria



Ball Mustard 5.8X
Neslia paniculata

MEADOW SALSIFY

Composite Family

Tragopogon pratensis
Biennial or Perennial

Other common names: Yellow Goatsbeard, Oyster Plant, Buckbeard, Yellow Salsify, Morning Sun, Goatsbeard, Noon Flower, Go-to-Bed-at-Noon, Nap-at-Noon.

Highly elongated, broadest at about the middle; ventral margin straight and dorsal margin convex. Gradually tapered to a narrow, truncate base and to the apex which bears a long awnlike projection. Awnlike projection about ten millimeters long, expanded at the tip, and tipped with a parachute of brown bristles. Parachute easily removed and seldom present; part of the projection may also be broken off. Five-sided in cross section. Surface with five prominent, spiny, longitudinal ribs and a lesser rib in each interspace. Seed frequently curved. Seed scar oval, oblique, depressed, and with slender seed stalk remnant in center. Yellowish to greyish-brown. 10.0-13.0mm long, 1.3-1.8mm wide.

WILD PARSNIP

Parsley Family

Pastinaca sativa
Biennial

Other common names: Queen Weed, Tank, Madnip, Field Parsnip, Bird's Nest, Hartseye.

Broadly oval to circular in outline; highly flattened. Apex with a broad shallow notch; base slightly extended with narrow notch on each side. Ventral side with central, longitudinal rib which is flanked by a dark brown, slightly curved stripe on each side; surface granular. Dorsal side with three fine ribs which alternate with four dark brown stripes; surface granular. Margins prominently winged with a narrow ridge along the inner boundary of the wings. Seed scar depressed, roughly triangular in shape. Straw-colored with dark brown or reddish-brown stripes as described. 5.0-7.0 long, 4.0-5.7mm wide.

OXTONGUE

Composite Family

Picris echioides
Annual or Biennial

Other common names: Bitter Bugloss, Bristly Oxtongue, Bugloss Picris.

Narrowly obovate in outline; oval in cross section. Broadest near the apex and gradually tapered to a rounded base. Apex rounded and terminating in a slender stalk which is tipped by a parachute of hairs. Parachute almost always absent and part of the stalk frequently broken off. Surface with irregular, transverse ridges which are narrow and crowded at the base and gradually become wider and deeper approaching the apex. Some seeds curved and some have a "pinched" or constricted area immediately above the base. Hilum oval, depressed, and usually with five grooves joining its margins. Surface glossy. Yellowish-brown. 3.0-3.5mm long, 0.3-1.1mm wide.

HOUND'S TONGUE

Borage Family

Cynoglossum officinale
Biennial

Other common names: Gipsy Flower, Common Hound's Tongue, Sheep Lice, Dog Bur, Beggar's Lice, Woolmat, Dog's Tongue, Common Bur.

Obovate or sector-shaped in outline; tapered to a narrow base. One face flattened, depressed, bordered by a rim of dense, stout, hooked spines. Margins rounded and the other face slightly convex giving the seed a plano-convex appearance. Convex side with a triangular, concave seed scar and with the style extending beyond and curved over the end of the seed. Entire surface covered with spines but more concentrated along the margins. Some spines are usually broken off in handling leaving a short, hollow spine remnant. Seed unit is a nutlet which occurs in a grouping of four and is attached to the base of the style. Brown or greyish-brown. 5.0-7.0mm long, 4.0-5.0mm wide.



Meadow Salsify 3.6X
Tragopogon pratensis



Wild Parsnip 3.6X
Pastinaca sativa



Oxtongue 3.6X
Picris echioides



Hound's Tongue 3.6X
Cynoglossum officinale

FIELD BINDWEED

Convolvulus Family

Convolvulus arvensis
Perennial

Other common names: Creeping Jenny, Creeping Charley, Small Flowered Morning Glory, Small Bindweed, Vine Weed, Lap Love, Hedge Bells, Cowbind, Bellbind, European Bindweed, Wild Morning Glory, Cornbind, Bearbind, Green Vine.

Broadly obovate in outline; thick, sector-shaped in cross section. Dorsal side strongly convex especially near the apex, the two faces of the ventral side straight or only slightly concave and form a blunt ridge where they join. Seed scar oval, small, positioned in a notched area of the base, and lies parallel to the long axis of the seed. Surface dull, covered with abundant, whitish, blunt tubercles or wavy ridges. Greyish-brown. 4.0-4.5mm long, 2.4-3.0mm wide.

HEDGE BINDWEED

Convolvulus Family

Convolvulus sepium
Perennial

Other common names: Bracted Bindweed, Large Flowered Morning Glory, Morning Glory, Wild Morning Glory, Greater Bindweed, Hedge Lily, Devil's Vine, Rutland Beauty.

Broadly obovate in outline; thick, sector-shaped in cross section. Dorsal side strongly convex, the two faces of the ventral side form a rounded ridge where they joint and each face has a broad, concave area. Seed scar is kidney-shaped, yellowish to reddish-brown, depressed, large, and lies in an oblique position. Surface dull, sparsely covered with small, whitish, tubercle-like projections but some seeds are smooth. Reddish-brown to black. 4.0-6.0mm long, 3.5-4.0mm wide.

CORN GROMWELL

Borage Family

Lithospermum arvense
Annual or Biennial

Other common names: Field Gromwell, Wheat Thief, Pigeonweed, Stoneseed, Redroot, Bastard Alkanet, Gromwell, Puccoon.

Shaped like a hood or "night cap with erect point," broadest near the middle, gradually tapered to a wide, oval, truncate base and sharply to a pointed apex. Base has two short protuberances and rimmed collar. Surface densely covered with warty tubercles. Dorsal side with central ridge which runs from the apex to about the middle or sometimes the entire length of the seed. Greyish-brown to brown. 2.6-3.7mm long, 1.7-2.6mm wide.

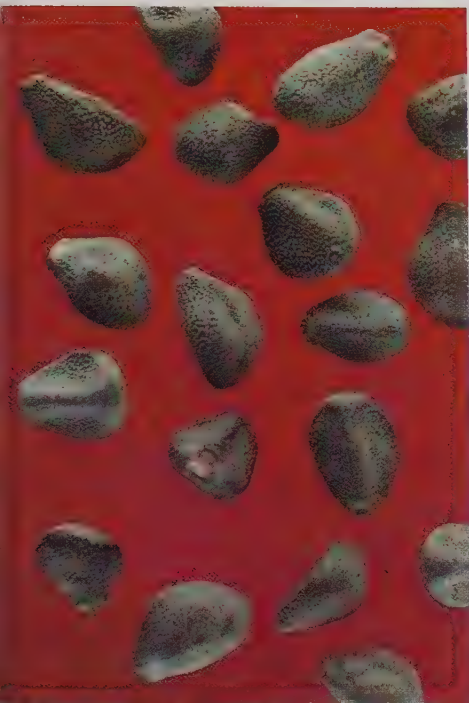
TALL IRONWEED

Composite Family

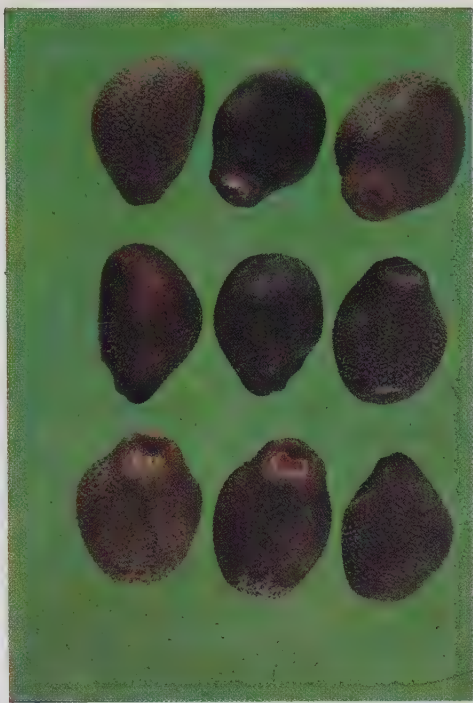
Vernonia altissima
Perennial

Other common names: Ironweed.

Elongated; broadest above the middle, tapered to a narrow base with a smooth, rounded, buttonlike tip. Slightly tapered to a broad, truncate apex which bears a parachute of unbranched bristles within a row of narrow scales. The bristles are about twice the length of the seed and are usually lacking but the row of scales usually remains. Surface is roughened by prominent, longitudinal ribs which are sparsely covered with short, weak spines; inter-rib spaces covered with tubercles. Oval in cross section. Yellowish-brown to brown. 2.4-3.0mm long, 0.7-0.8mm wide.



Field Bindweed 3.6X
Convolvulus arvensis



Hedge Bindweed 3.6X
Convolvulus sepium



Corn Gromwell 3.6X
Lithospermum arvense



Tall Ironweed 3.6X
Vernonia altissima

SPOTTED KNAPWEED

Composite Family

Centaurea maculosa
Biennial

Other common names: Knapweed.

Widest near the apex and tapered to a rounded base. Apex truncate and bearing two rows of bristles, the outer row about 1.3-2.0mm long and the inner row much shorter. Apex collar finely serrated. One side of the seed has prominent scar notch immediately above the base. Surface smooth, dull or with a slight sheen. Olive-green to black with four yellow, longitudinal lines and lesser lines between. Area adjacent to the seed scar usually yellow. 2.5-3.0mm long, 1.1-1.5mm wide.

RUSSIAN KNAPWEED

Composite Family

Centaurea repens
Perennial

Other common names: Turkestan Thistle.

Obovate to oval in outline; in lateral view, sometimes slightly curved. Oval in cross section. Apex truncate, frequently slightly depressed, and usually tipped by short, bluntly rounded style remnant. Base narrow, truncate, seed scar oblique, located at or near the base. Surface dull or with a slight sheen and has scattered, faint, longitudinal grooves. Whitish to yellow. 2.5-3.5mm long, 1.3-2.2mm wide.

COMMON BURDOCK

Composite Family

Arctium minus
Biennial

Other common names: Burdock, Beggar's Button, Wild Rhubarb, Bardane, Clotbur, Smaller Burdock, Cuckoo Button, Cockle Button.

Elongated; widest in the upper one-third of the seed, tapered to a truncate, wavy apex with sparse, blunt teeth and to a narrower, truncate base. Some seeds evenly tapered but frequently one edge is straight and the other convex. Apex with short, slender style remnant in the center. Flattened, three to five-sided. Surface dull, wrinkled, and sometimes with indefinite longitudinal ribs or grooves. Brown with black mottling or zig-zag pattern. Seeds borne in a bur whose surface is covered with hooked bracts. 4.5-6.0mm long, 2.3-2.7mm wide.

HEMP

Hemp Family

Cannabis sativa
Annual

Other common names: Wild Hemp, Marijuana, Indian Hemp, Gallowgrass, Red Root, Neckweed.

Oval to ovate in outline. Oval in cross section. Apex rounded, base truncate. Seed scar prominent, oval, deeply depressed. Surface smooth but with network of minute lines or veins similar in appearance to that of a checked egg. Yellow, tan, brown, or olive-brown and mottled with brown or black. 3.5-5.0mm long, 2.2-3.0mm wide.



Spotted Knapweed 3.6X
Centaurea maculosa



Russian Knapweed 3.6X
Centaurea repens



Common Burdock 3.6X
Arctium minus



Hemp 3.6X
Cannabis sativa

Anthemis arvensis
Annual or Biennial

Other common names: Field Chamomile.

Seeds of two types — ray seed and disk seed. Both types cone-shaped, broadest at the apex; both the apex and base truncate. Short, blunt remnant of seed stalk remains attached to the base; remnant of style attached to the center of a deeply depressed, circular area of the apex. Circular in cross section. Ray seed flared at the apex, frequently slightly curved. Disk seed usually not flared at the apex and usually straight-sided. Both types of seeds with broad, rounded, longitudinal ribs running the entire length of the seed. Yellowish-brown to reddish-brown. Ray seed 2.2-2.5mm long, 1.0-1.3mm wide. Disk seed 1.8-2.0mm long, 0.7-0.9mm wide.

CLAMMY WEED

Caper Family

Polanisia graveolens
Annual

Other common names: Clammy Clover, Stinking Clover, Butterfly Flower.

Almost circular in outline; shaped like a “curled tadpole” with its pointed tail extending slightly outward. Each face has a groove extending from the “pointed tail” to the center of the seed. The surface is dull and covered with a network of veins. Brown to reddish-brown. 1.9-2.2mm in diameter.

FIELD DODDER

Convolvulus Family

Cuscuta pentagona
Annual

Other common names: Love Vine, Devil's Hair, Strangleweed, Hairweed, Large-Seeded Dodder.

Oval to circular in outline. Dorsal side convex, ventral side usually two-faced forming central longitudinal ridge where they join and running from the apex to about the lower one-third of the seed. Hilum area large for size of seed, oval or circular, depressed, with small, white line in center; strongly oblique with one side of the seed frequently bulging above it. Surface granular, its texture and color like that of fine sandpaper. Tan to yellowish-tan. 1.1-1.6mm long, 0.9-1.3mm wide.

SMALL SEED ALFALFA DODDER

Convolvulus Family

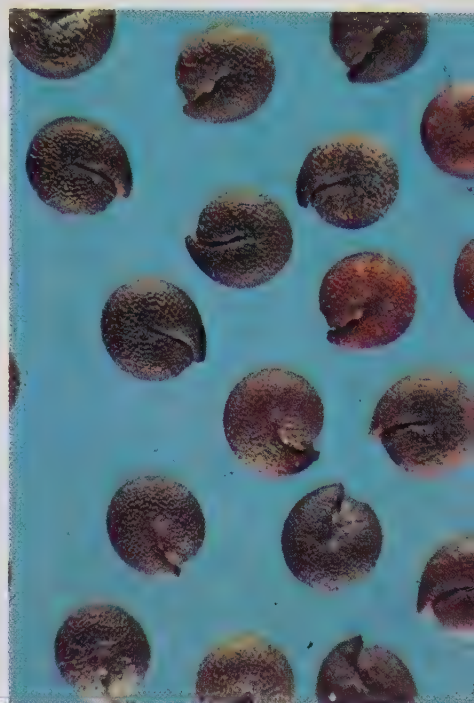
Cuscuta planiflora
Annual

Other common names: Littleseed Dodder.

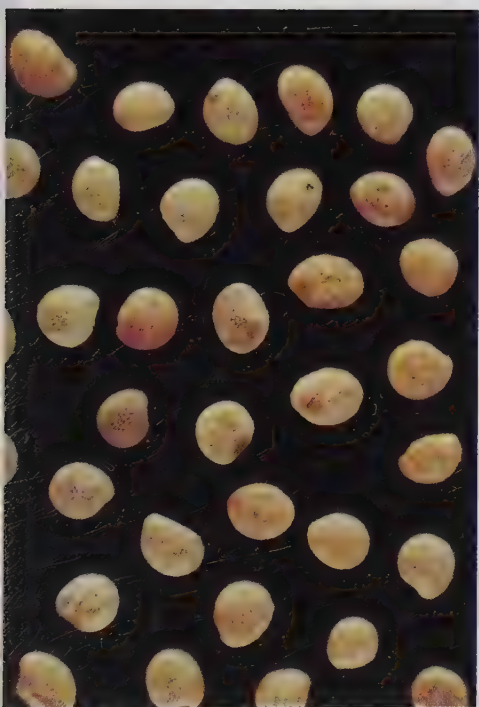
Shape variable; most frequently oval in outline with margins bulged. Most seeds with dorsal side convex, ventral side two-faced forming a rounded, longitudinal ridge which runs from the apex almost to the base. Surface granular, its texture and color like that of fine sandpaper. Hilum area a small, oval or circular area, darker colored than the rest of the seed, located in a slightly oblique position, level with the surface, and with a small, white dot in the center. Tan to yellowish-tan. 0.7-1.0mm long, 0.5-0.7mm wide.



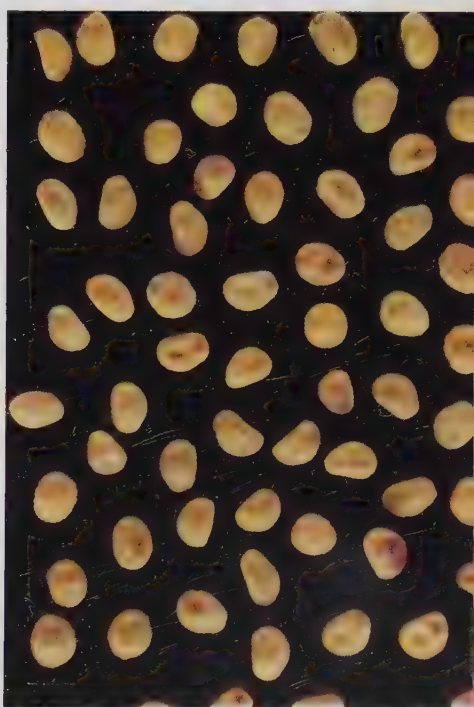
Corn Chamomile 5.8X
Anthemis arvensis



Clammy Weed 5.8X
Polansia graveolens



Field Dodder 5.8X
Cuscuta pentagona



Small Seed Alfalfa Dodder 5.8X
Cuscuta planiflora

THOROUGHWORT

Composite Family

Eupatorium serotinum
Perennial

Other common names: Thoroughwort.

Elongated; oblong except for being slightly tapered to the apex and more sharply to a pointed, frequently elongated base. Apex truncate, its periphery bearing a tuft of long, whitish, upwardly barbed bristles, and usually with a stout, central, style remnant. If bristles are removed, a narrow, slightly flared, light colored rim remains. Four-angled, the angles sharp and slightly raised, sides slightly depressed. Surface dull. Brown to black. 1.5-2.4mm long, 0.3-0.6mm wide.

GUMWEED

Composite Family

Grindelia squarrosa
Perennial

Other common names: Tarweed, Rosinweed, Curlycup, Gum Plant, Grindelia, Scaly Grindelia, Broad-Leaved Gum Plant.

Elongated; usually broadest slightly above the middle, tapered to a rounded, narrow, truncate base and upward to an oblique, truncate apex. Some seeds straight, others curved, but some are short, broad and about the same width throughout. Flattened and roughly four-angled. Some seeds smooth, others with indefinite, longitudinal ribs. Apex wavy, sometimes concave, with a short, rounded style remnant centrally attached. Seed scar oval. Tan to greyish-brown. 2.5-4.7mm long, 1.0-1.7mm wide.

MAYWEED

Composite Family

Anthemis cotula
Annual or Winter Annual

Other common names: Dog Fennel, Stinking Chamomile, Dog Daisy, Chigger Weed, Dog Finkle, Dillweed, Fetid Chamomile, Stinking Daisy, White Stinkweed, Dog's Chamomile, Hog's Fennel.

Elongated, tapered from the apex to base and sometimes slightly curved. Circular in cross section. Apex with short, stout, style remnant; seed scar is surrounded by a collar and a light colored remnant of the seed stalk frequently remains attached. Surface has ten longitudinal ribs which bear wartlike tubercles. Inter-rib spaces granular. Yellowish-brown to greyish-brown. 1.3-1.8mm long, 0.7-1.0mm wide.

ORANGE HAWKWEED

Composite Family

Hieracium aurantiacum
Perennial

Other common names: Devil's Paintbrush, Red Daisy, Devil's Weed, Grim-the-Collier, Paintbrush, Orange Paintbrush.

Elongated; frequently oblong. The margins of many if not most seeds are about parallel from the apex to near the base, at which point they taper sharply. Some seeds may taper slightly from the apex to the base. Usually circular in cross section, but some may be four-sided. Surface covered with narrow, longitudinal ribs. Apex bears a short pappus, or if removed, a light colored ring or collar remains. Seed scar light colored. Dark brown to black. 1.8-2.2mm long, 0.3-0.4mm wide.



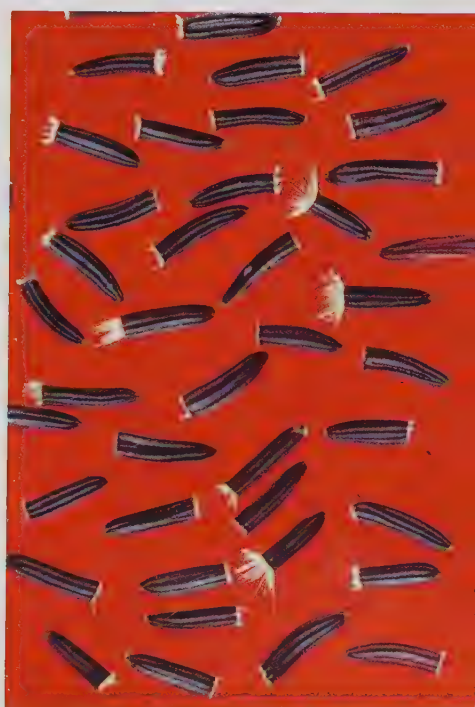
Thoroughwort 5.8X
Eupatorium serotinum



Gumweed 5.8X
Grindelia squarrosa



Mayweed 5.8X
Anthemis cotula



Orange Hawkweed 5.8X
Hieracium aurantiacum

POVERTY WEED

Composite Family

Iva axillaris

Perennial

Other common names: Devil's Weed, Small-Flowered Marsh Elder, Gumbo Weed, Death Weed.

Triangular in outline; diamond-shaped or rhombic in cross section. Apex broadly rounded and with a short, circular style remnant centrally attached or if detached a broad, slightly raised scar remains. Base pointed and frequently narrowly truncate. Surface dull, granular. Greyish-brown with yellowish, honey-like coating. 1.7-2.4mm long, 1.3-1.7mm wide.

MARSH ELDER

Composite Family

Iva xanthifolia

Annual

Other common names: Burweed Marsh-Elder, False Sunflower, Trailweed, High-Water Shrub, Sumpweed, Bigleaf Sumpweed, False Ragweed, Red River Weed, Halfbreed Weed.

Triangular in outline; diamond-shaped or rhombic in cross section. Apex broadly rounded, with short style remnant centrally attached or if detached a broad, slightly raised seed scar remains. Base pointed, lighter colored. In edge view, the seed usually curved. Under magnification surface appears to be finely ribbed and from certain angles it may appear granular. Brownish-black to black with greyish or yellowish coating on part of the surface. 1.7-2.5mm long, 1.1-1.6mm wide.

CAROLINA GERANIUM

Geranium Family

Geranium carolinianum

Annual or Biennial

Other common names: Cranesbill, Carolina Cranesbill, Wild Geranium.

Oval or oblong in outline; circular in cross section. Surface covered with a network of fine, light colored veins and relatively large, elongated, shallow interspaces. Hilum slightly raised. A fine ridge runs from the hilum area to the opposite end of the seed. Dark brown. 1.7-2.0mm long, 1.1-1.3mm wide.

TANSY

Composite Family

Tanacetum vulgare

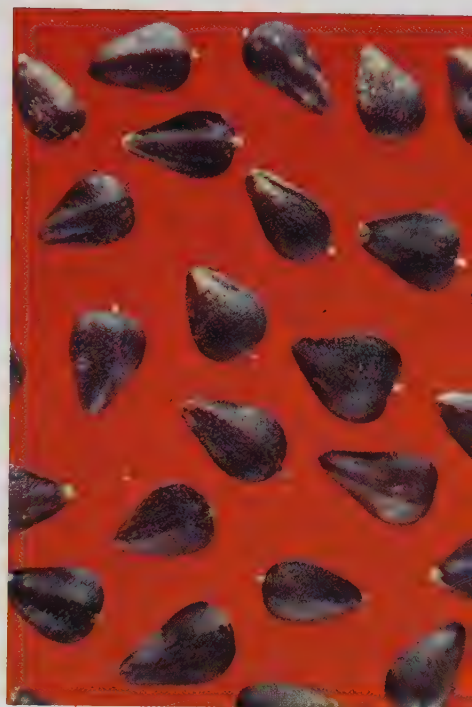
Perennial

Other common names: Common Tansy, Ginger Plant, Parsley Fern, Bitter Buttons, Hindhead.

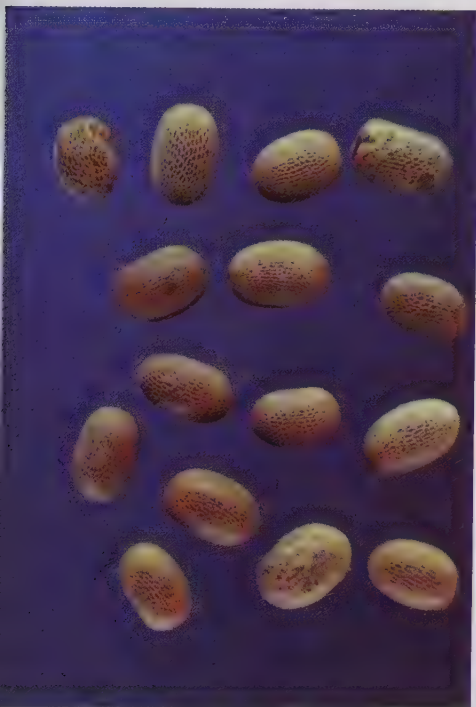
Elongated, broadest near the apex, tapered to a truncate base and upward to a truncate, slightly expanded and toothed collar. Base with narrow, prominent rim; seed scar depressed. Oval in cross section. Surface dull, granular, and with narrow, longitudinal ribs. Straw-colored to greyish-brown. 1.3-1.7mm long, 0.5-0.7mm wide.



Poverty Weed 5.8X
Iva axillaris



Marsh Elder 5.8X
Iva xanthifolia



Carolina Geranium 5.8X
Geranium carolinianum



Tansy 5.8X
Tanacetum vulgare

SMALL FLOWER GALINSOGA

Composite Family

Galinsoga parviflora
Annual

Other common names: Quickweed, Galinsoga.

Peg-shaped in outline; widest at the apex and tapered to a narrow base. Surface is densely covered with short, whitish, ascending hairs and has fine, longitudinal grooves. The apex has a well developed pappus of narrow scales which are almost as long as the seed. The seeds are two types — ray seeds and disk seeds. The ray seed is slightly curved, rhombic in cross section, and its pappus not as well developed as the disk seed. The disk seed is straight, square in cross section, and bears a well developed pappus of scales. If the pappus has been removed, a conspicuous, white collar is still evident at the apex. Seed scar white. Brownish-black. 1.1-1.6mm long, 0.6-0.7mm wide.

BITTER SNEEZEWEED

Composite Family

Helenium tenuifolium
Annual

Other common names: Fine Leaved Sneezeweed, Yellow Dog Fennel, Bitterweed, Fennel.

Peg-shaped in outline; widest at the apex and tapered to a narrow, truncate base. Four-sided. Surface dull, practically obscured by long appressed hairs originating at the base and usually as long or longer than the seed. Apex tipped with a pappus of five or six broadly ovate, awned scales. Seed scar oval. Reddish-brown. 1.0-1.5mm long, 0.6-0.9mm wide.

SCARLET PIMPERNEL

Primrose Family

Anagallis arvensis
Annual

Other common names: Red Pimpernel, Corn Chamomile, Field Chamomile, Common Pimpernel, Poor Man's Weather Glass, Red Chickweed, Poison Chickweed, Wink-a-Peep, Shepherd's Clock, Poisonweed, Eyebright.

Pyramidal, three to five-sided; triangular in cross section. Surface roughened by dense, reddish-brown scales. Seed scar black, smooth, narrow, highly elongated. Reddish-brown to brown. 0.9-1.2mm long, 0.6-0.9mm wide.

BLACKEYED SUSAN

Composite Family

Rudbeckia serotina
Perennial

Other common names: Cone Flower, Yellow Daisy, Browneyed Susan, Golden Jerusalem, Oxeye Daisy, Darkey Head.

Elongated, narrow, slightly tapered from truncate apex to a bluntly rounded base. Sometimes slightly curved. Four-sided, corners sharply angular. Remnant of style usually remains attached to the center of the apex. Surface with fine, longitudinal ribs. Dark brown to black. 1.5-2.2mm long, 0.4-0.6mm wide.



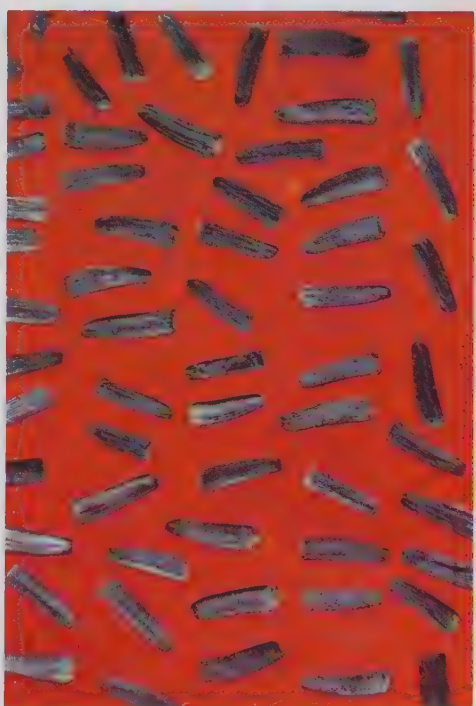
Small Flower Galinsoga 5.8X
Galinsoga parviflora



Bitter Sneezewood 5.8X
Helenium tenuifolium



Scarlet Pimpernel 5.8X
Anagallis arvensis



Blackeyed Susan 5.8X
Rudbeckia serotina

COCKLEBUR

Composite Family

Xanthium pensylvanicum
Annual

Other common names: Clotbur, Sheepbur, Ditchbur, Burweed, Buttonbur, Hedgehog Burweed.

Broadly ovate in outline; plano-convex. Apex broadly rounded and terminating in a short, pointed tip which is frequently broken off. Both faces have sparse, fine longitudinal ridges and broad, transverse wrinkles. Seed frequently curved toward the flat side. Seeds are borne in burs which are one-half to one inch long, two-seeded, and covered with prominent, hooked spines. Seed dark brown to black. 12.0-14.0mm long, 4.5-5.0mm wide.

WILD CUCUMBER

Gourd Family

Echinocystis lobata
Annual

Other common names: Mock Apple, Wild Balsam Apple, Prickly Cucumber, Four Seeded Bur Cucumber, Climbing Wild Cucumber.

Broadly oval or spindle-shaped in outline; flattened with both faces slightly convex. Apex terminates in a broad point, base truncate. Surface granular. Each face with a broad, light brown border which appears as if it were coated; center a reddish-brown. Seed scar narrow, linear, tan. 15.0-20.0mm long, 7.0-8.0mm wide.

TALL LETTUCE

Composite Family

Lactuca canadensis
Annual or Winter Annual

Other common names: Wild Lettuce, Canada Wild Lettuce, Horsetweed, Wild Opium, Trumpet Milkweed.

Broadly oval or obovate in outline; highly flattened. Apex bears a long, slender stalk or awnlike projection which is expanded at the tip and bears a pappus of hairs. Pappus easily detached and almost always removed but the stalk or a part of it frequently remains. Each face with a prominent mid-rib and numerous, irregular, transverse ridges. Margins are sometimes slightly curved. Seed scar oval, depressed. 4.0-5.0mm long, 2.0-2.5mm wide.

WILD FOUR O'CLOCK

Four O'clock Family

Mirabilis nyctaginea
Perennial

Other common names: Umbrella Wort, Heartleaved Umbrella Wort, Umbrella Plant.

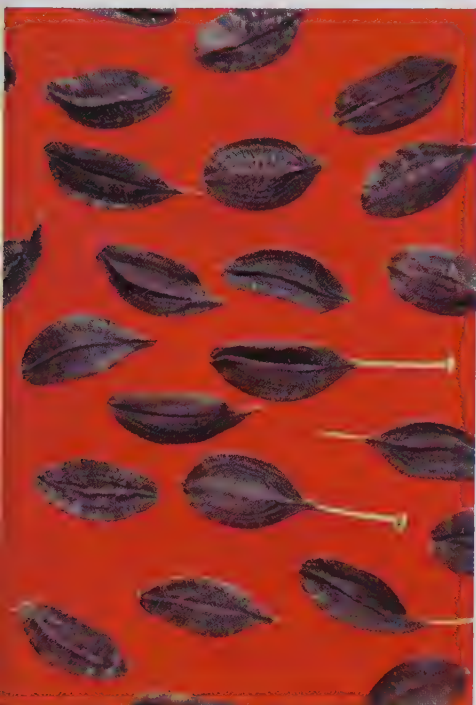
Club-shaped in outline, five-angled in cross section. Seed with five longitudinal ribs which are cross-grooved giving the appearance of blunt protuberances. Inter-rib spaces roughened with warty protuberances. Surface usually densely covered with hairs which point in various directions. Greyish-brown to light brown. 4.0-5.0mm long, 1.5-1.7mm wide.



Cocklebur 3.6X
Xanthium pensylvanicum



Wild Cucumber 3.6X
Echinocystis lobata



Tall Lettuce 3.6X
Lactuca canadensis



Wild Four O'Clock 3.6X
Mirabilis nyctaginea

IVY LEAF MORNING GLORY

Convolvulus Family

Ipomoea hederacea
Annual

Other common names: Wild Morning Glory, Annual Morning Glory.

Ovate in outline; thick, sector-shaped. Dorsal side strongly convex with a shallow, central, longitudinal furrow. Ventral side has two equal, flattened faces which are slightly depressed at the margins. Seed scar prominent, horseshoe-shaped, with open end towards the base; scar covered with dense, very short, coarse, greyish or reddish hairs and lies in a deep notch at the base and parallel to the long axis of the seed. Surface dull, roughened by fine pits. Greyish-black to black. 5.0-6.0mm long, 3.0-4.0mm wide.

BIG ROOT MORNING GLORY

Convolvulus Family

Ipomoea pandurata
Perennial

Other common names: Man-of-the-Earth, Clustered Blue Morning Glory, Wild Potato Vine, Wild Sweet Potato, Mecha-Meck.

Obovate in outline; flattened. Ventral side with two flattened faces, dorsal side is slightly convex. Seed scar horseshoe-shaped, with open end towards the base, free of hair, and lies parallel to the long axis of the seed. Surface dull, slightly roughened, margin covered with numerous long, soft hairs which may be removed in handling. Reddish-brown to dark brown. 5.0-6.5mm long, 4.0-5.0mm wide.

COMMON MORNING GLORY

Convolvulus Family

Ipomoea purpurea
Annual

Other common names: Wild Morning Glory, Annual Morning Glory.

Obovate to oval in outline; thick, sector-shaped. Dorsal side strongly convex with shallow, central, longitudinal furrow. Ventral side has two equal, flattened faces which usually have one or two cross wrinkles and a thin line along each of the outer margins. Seed scar horseshoe-shaped, the open end facing the base, granular, and free of hair or with only a few short hairs; scar lies in a shallow notch at the base of the ventral ridge and parallel to the long axis of the seed. Surface dull, finely granular. Brown to black. 4.7-5.7mm long, 3.3-4.0mm wide.

TALL CONE FLOWER

Composite Family

Rudbeckia laciniata
Perennial

Other common names: Thimble Weed, Golden Glow.

Elongated; broadest near the apex and gradually tapered to the base. Four-sided, angles or corners raised and sides or faces slightly depressed. Apex truncate with a short tooth on each corner. Base oblique and appears as if one-half of a side is notched out. Surface dull and slightly roughened by occasional grooves. Greyish-black to black. 4.0-5.0mm long, 1.1-1.3mm wide.



Ivy Leaf Morning Glory 3.6X
Ipomoea hederacea



Big Root Morning Glory 3.6X
Ipomoea pandurata



Common Morning Glory 3.6X
Ipomoea purpurea



Tall Coneflower 3.6X
Rudbeckia laciniata

CURLY DOCK

Buckwheat Family

Rumex crispus
Perennial

Other common names: Curled Dock, Sour Dock, Yellow Dock, Narrow-Leaved Dock.

Broadly ovate in outline, sharply tapered to a short pointed apex and to the base; base with a short stalk. Angles obtuse and narrowly winged. Triangular in cross section. Surface smooth, glossy. Reddish-brown, frequently darker colored on the angles. 2.1-2.6mm long, 1.4-1.7mm wide (about 1.5 times as long as wide).

BROAD-LEAF DOCK

Buckwheat Family

Rumex obtusifolius
Perennial

Other common names: Bitter Dock, Blunt Leaved Dock, Red Veined Dock, Celery Seed.

Broadly ovate in outline, tapered to a pointed apex and to the base which bears a short stalk. Triangular in cross section. Angles obtuse and frequently not winged or at least not distinctly winged. Surface smooth, glossy. Chocolate brown and angles not darker colored. 2.0-2.5mm long, 1.1-1.5mm wide (More than 1.5 times longer than wide).

SMOOTH DOCK

Buckwheat Family

Rumex altissimus
Perennial

Other common names: Pale Dock, Tall Dock, Smooth-Leaf Dock, Peach-Leaved Dock.

Broadly ovate in outline with short pointed apex; triangular in cross section. Angles acute, margins narrowly winged. Surface smooth, glossy. Reddish brown. 2.0-2.7mm long, 1.3-1.7mm wide.

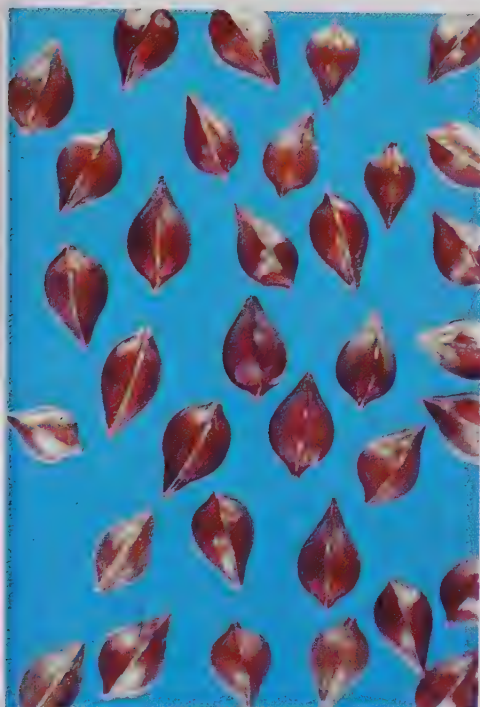
WILD BUCKWHEAT

Buckwheat Family

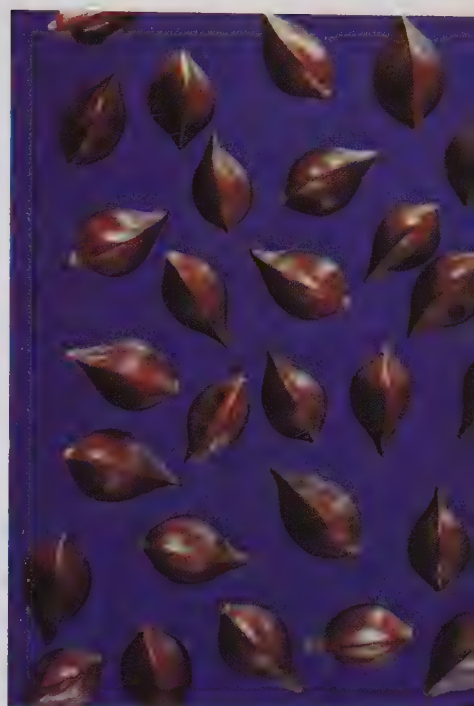
Polygonum convolvulus
Annual

Other common names: Black Bindweed, Corn Bindweed, Climbing Bindweed, Cornbind, Knot Bindweed, Bearbind, Ivy Bindweed.

Roughly oval in outline, the tip and occasionally the base elongated; triangular in cross section. The sides usually unequal in width, dull, finely roughened, and frequently slightly concave. Angles blunt, rounded, and glossy. Remnant of perianth usually remains attached to the base. Dark brown to black. 3.0-4.0mm long, 2.0-2.5mm wide.



Curly Dock 5.8X
Rumex crispus



Broad Leaf Dock 5.8X
Rumex obtusifolius



Smooth Dock 5.8X
Rumex altissimus



Wild Buckwheat 5.8X
Polygonum convolvulus

YELLOW FOXTAIL

Setaria lutescens
Annual

Grass Family

Other common names: Wild Millet, Bottlegrass, Pigeongrass, Yellow Bristlegrass, Pussy-grass, Summer Grass, Golden Foxtail.

Appears in crop seeds as a spikelet, fertile floret, or sometimes as a hulled grain.

Spikelet oval to ovate in outline; plano-convex. In edge view, highly convex and thickest at about the middle. Spikelet has a short, first glume and sterile lemma on the flattened side and a second glume on the convex side. Second glume is about one-half the length of the seed leaving the upper one-half of the fertile floret exposed. Glumes and sterile lemma straw-colored, longitudinally nerved and thin. Under minimal handling, five or more bristles may remain attached to the base.

Fertile floret oval to ovate in outline; plano-convex. Surface of fertile lemma with prominent, irregular, transverse ridges. In edge view, thickest at about the middle. Yellowish-green to black depending on the maturity. 2.5-3.0mm long, 1.8-2.1mm wide.

GREEN FOXTAIL

Setaria viridis
Annual

Grass Family

Other common names: Bristlegrass, Pigeongrass, Wild Millet, Green Bristlegrass, Bottlegrass, Green Bottlegrass.

Appears in crop seeds as a spikelet, fertile floret, or sometimes as a hulled grain.

Spikelet oval to ovate in outline; plano-convex. In edge view, the seed is about the same thickness throughout except for the apex which is flattened. Spikelet has a short, first glume and sterile lemma on the flattened side and a second glume on the convex side. Second glume extends to the tip and the fertile floret is completely covered by the second glume and sterile lemma. Glumes and sterile lemma yellowish-green or straw-colored, longitudinally nerved, thin. Under minimal handling, one to three bristles may remain attached to the base.

Fertile floret oval to ovate in outline; plano-convex. In edge view, about the same thickness throughout except for a flattened apex. Surface of the fertile lemma granular, ranging in color from yellowish to dark brown depending on the maturity and frequently mottled with dark brown or black. A shiny, smooth line is frequently present along the outer margin and is evident when viewed from the flat side. 1.8-2.2mm long, 1.0-1.3mm wide.

GIANT FOXTAIL

Setaria faberii
Annual

Grass Family

Other common names: Tall Foxtail.

Appears in crop seeds as a spikelet, fertile floret, or sometimes as hulled grain.

Spikelet oval to ovate in outline, plano-convex. In edge view, highly convex and thickest below the middle. Spikelet has a short, first glume and sterile lemma on the flattened side and a second glume on the convex side. Second glume about three-fourths or four-fifths the length of the seed leaving the upper one-fourth of the fertile floret exposed. Glumes and sterile lemma longitudinally nerved, straw-colored, and thin. Under minimal handling, three to six bristles may remain attached to the base.

Fertile floret oval to ovate in outline, plano-convex. Surface of fertile lemma granular or slightly cross-ridged. In edge view, thickest below the middle. Yellowish-green, brown, or black depending on the maturity. 2.2-2.5mm long, 1.2-1.5mm wide.

BRISTLY FOXTAIL

Setaria verticillata
Annual

Grass Family

Other common names: Bristlegrass, Rough Bristlegrass, Bur Bristlegrass, Pigeon Grass.

The characteristics of Bristly Foxtail and Green Foxtail are too similar to differentiate between them unless the bristles remain attached to the base of the spikelet. Bristly Foxtail usually has one bristle, rarely two or three, and they are downwardly barbed. Green Foxtail has one to three bristles and they are upwardly barbed.



Yellow Foxtail 5.8X
Setaria lutescens



Green Foxtail 5.8X
Setaria viridis



Giant Foxtail 5.8X
Setaria faberii



Bristly Foxtail 5.8X
Setaria verticillata

Other common names: Water Grass, Barn Grass, Cockspur Grass, Cocksfoot Panicum, Panic Grass.

Seed unit in crop seeds usually is the fertile floret or spikelet.

Fertile floret ovate in outline; plano-convex with dorsal side strongly arched; broadest at about the middle, apex pointed and frequently flattened. Surface smooth, glossy. Yellowish-green to yellowish-brown and the dorsal side has light, longitudinal lines. 2.2-3.0mm long, 1.6-2.2mm wide.

Spikelet oval or ovate in outline; plano-convex, strongly arched in side view. First glume (flattened side) is wrapped around the base, its apex pointed, and about one-third the length of the spikelet. Second glume (convex side) is sharply pointed and bears a central nerve and two closely spaced nerves along each margin. The nerves are spined, at least in the upper one-half of the seed, and the internerve spaces are hairy. Sterile lemma (flattened side) has two or three nerves which are spined and may terminate in a sharp point or a long awn. Straw-colored to light brown. 3.0-3.5mm long, 1.8-2.4mm wide.

PRICKLY LETTUCE

Lactuca scariola
Annual or Winter Annual

Composite Family

Other common names: Wild Lettuce, Milk Lettuce, Milk Thistle, Compass Plant, Wild Opium, English Thistle, Weed Milk Thistle, Horse Thistle.

Obovate or spindle-shaped in outline; flattened and narrowly elliptical in cross section. Apex bears a slender stalk or awnlike projection which is tipped with a pappus of hairs. The pappus is easily detached and almost always absent and the stalk is frequently broken off leaving only a short remnant. Surface with prominent, longitudinal ribs which are minutely barbed in the lower one-third of the seed but sparsely covered with longer, fine bristles in the upper part. Seed scar oval, light colored. Greyish-yellow to yellowish-brown. 3.0-4.0mm long, 1.1-1.5mm wide.

ANNUAL SOW THISTLE

Sonchus oleraceus
Annual

Composite Family

Other common names: Common Sow Thistle, Hare's Lettuce, Colewort, Milk Thistle, Thistle Milkweed, Milky Tassel, Swinies.

Spindle or club-shaped in outline; widest above the middle and strongly tapered to a narrow truncate base and apex, both of which have rimmed collars. One margin is usually more curved than the other. Apex tipped with parachute of hairs which is easily broken off and seldom present, but a short style remnant usually remains. Elliptical in cross section. Surface covered with longitudinal ribs, some of which are considerably more prominent than others. Some ribs indistinct and frequently merge into one another. Ribs cross-grooved and the inter-rib space also cross-grooved or wrinkled. Brown to reddish-brown. 2.6-3.3mm long, 0.7-1.1mm wide.

PERENNIAL SOW THISTLE

Sonchus arvensis
Perennial

Composite Family

Other common names: Field Sow Thistle, Gutweed, Corn Sow Thistle, Creeping Sow Thistle, Swine Thistle, Milk Thistle.

Narrowly elliptical in outline; widest at or slightly above the middle, gradually tapered to a truncate base and to a truncate apex both of which have rimmed collars. Frequently slightly curved. Apex tipped with a parachute of hairs which is easily broken off and seldom present but a slender remnant of the style usually remains. Flattened, narrowly elliptical in cross section. Surface covered with prominent, longitudinal ribs which are cross-grooved and may give the appearance of being tubercled. Dark brown to reddish-brown. 2.4-3.0mm long, 0.7-1.1mm wide.



Barnyard Grass 5.8X
Echinochloa crusgalli



Prickly Lettuce 5.8X
Lactuca scariola



Annual Sow Thistle 5.8X
Sonchus oleraceus



Perennial Sow Thistle 5.8X
Sonchus arvensis

DOWNY BROMEGRASS

Grass Family

Bromus tectorum
Annual or Winter Annual

Other common names: Downy Chess, Wild Oat, Military Grass, Cheatgrass, Slender Chess, Downy Brome, Early Chess, Wild Brome, Cheatgrass Brome, Hobograss.

Lanceolate in outline, tapering to both ends. Lemma prominently nerved, covered with soft hairs which become longer near the tip, and with middle nerve extending into a long awn which is equal to or longer than the lemma. Lemma inrolled, keel-shaped near the base, and becomes transparent near the tip at which point it splits forming two pointed segments. Palea readily visible, forms a shallow, concave cavity, its keel sparsely covered with long hairs between which are shorter hairs, Callus pointed with sparse short hairs on each end. Hulled grain thin. Rachilla flattened on the back, convex in the front, and bulged at the top. Greyish-yellow to purplish. 8.0-12.0mm long, 0.9-1.1mm wide.

PORCUPINE GRASS

Grass Family

Stipa spartea
Perennial

Other common names: Needle Grass, Devil's Darning Needle, Weather Grass, Auger-Seed Grass.

Dagger-shaped in outline, highly elongated. Broadest below the middle, tapered to sharply pointed base and gradually to a blunt apex which bears a twisted awn three to five inches in length. The awn, which may be partially broken off, twists when dry and untwists when wet. The lemma is covered with short hairs, is strongly inrolled leaving only a narrow strip of the palea visible. The base is covered with a dense tuft of soft hairs and the rachilla is not visible. Light brown. 6.0-12.0mm long, 0.6-0.7mm wide.

QUACK GRASS

Grass Family

Agropyron repens
Perennial

Other common names: Couch Grass, Quitch Grass, Witch Grass, Twitch Grass, Quick Grass, Wheat Grass, Scutch Grass, Dog Grass, Devil's Grass, Whickens, Shelly Grass.

Lance-shaped in outline; in lateral view the ventral side is slightly arched; bluntly crescent-shaped in cross section. Lemma convex, smooth, semi-glazed, tipped with an awn about one-third to one-half the length of the seed. Palea concave, usually notched at the tip, folded in the lower one-half, its keel bearing short, broad based, hairlike projections. Sinus U-shaped, rachilla well exposed, about one-sixth to one-fifth the length of the seed. Straw-colored but sometimes with a greenish tinge. 8.0-9.0mm long, 1.3-1.8mm wide.

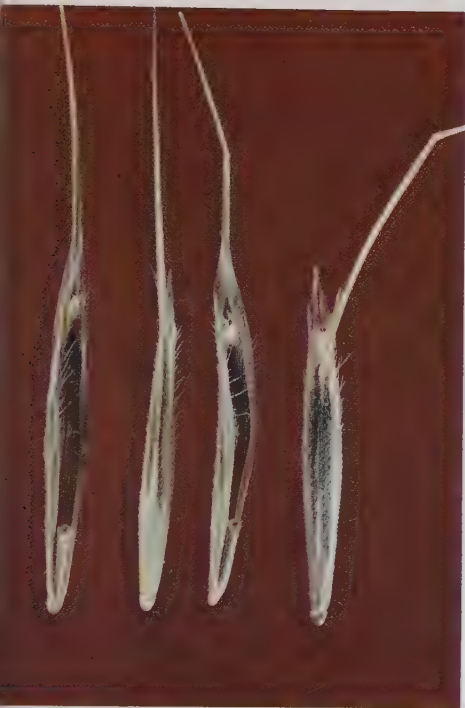
WILD OAT

Grass Family

Avena fatua
Annual

Other common names: Oatgrass, Wheat Oats, Poor Oats, Flax Grass.

Floret highly elongated, narrowly elliptical in outline and broadest near the middle. Lemma encircles the palea, its margins inrolled, completely covering the palea at the apex and all but a narrow band near the base. Kidney-shaped in cross section. Surface of the lemma distinctly nerved, may be granular or smooth, and densely covered with hairs or glabrous. Long, black, twisted awn originates at about the middle of the lemma, lies in a rounded furrow, and is sharply bent above the apex of the floret at which point it may be broken off. Callus oval, oblique, sunken, with upraised collar, and surrounded by a tuft of short or long hairs. The term "sucker mouth" is frequently used to describe the callus. Brownish, grey, black, or yellow. 11.0-14.0mm long, 2.0-5.5mm wide.



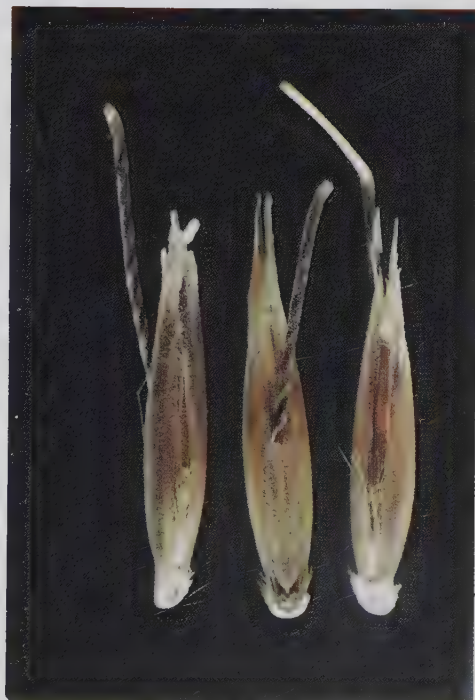
Downy Brome grass 3.6X
Bromus tectorum



Porcupine Grass 2.4X
Stipa spartea



Quack Grass 3.6X
Agropyron repens



Wild Oat 3.6X
Avena fatua

WITCH GRASS

Grass Family

Panicum capillare
Annual

Other common names: Ticklegrass, Tumble Panicgrass, Old Witchgrass, Tumblegrass, Tumble Weed, Fool Hay, Witch's Hair.

Seed unit in crop seeds a spikelet or a fertile floret.

Spikelet elliptical or oval in outline with a sharply pointed apex. First glume (flattened side) wrapped around base of the spikelet, its apex pointed, and one-third to one-half the length of the spikelet. Second glume (convex side) and sterile lemma (flattened side) are prominently nerved and frequently spread apart at the tip. In lateral view, strongly arched. Straw-colored. 2.0-2.7mm long, 0.6-0.9mm wide.

Fertile floret oval or ovate in outline; plano-convex. Surface smooth, glossy. Dorsal side with light, longitudinal lines, frequently five to seven in number. In lateral view, strongly arched. Scar small. Greenish-yellow, greenish-black, or brown. 1.1-1.6mm long, 0.5-0.7mm wide.

FALL PANICUM

Grass Family

Panicum dichotomiflorum
Annual

Other common names: Fall Panicgrass, Spreading Witchgrass, Spreading Panicgrass, Spreading Panicum, Kneegrass, Sprouting Crabgrass.

Occurs in crop seeds as a spikelet or fertile floret.

Spikelet elliptical or oval in outline with a sharply pointed apex. First glume (flattened side) wrapped around the base and about one-fifth to one-fourth as long as the spikelet, its apex rounded. Second glume (convex side) and sterile lemma (flattened side) are prominently nerved. In lateral view, not strongly arched as in Witch Grass. Callus area large and roughly triangular. Straw-colored. 2.4-3.0mm long, 0.8-1.1mm wide.

Fertile floret oval or ovate in outline; plano-convex. Surface smooth, glossy. Dorsal side with fine, yellowish longitudinal lines. In lateral view, not strongly arched, scar small. Olive-green. 1.1-1.8mm long, 0.6-0.9mm wide.

NIMBLEWILL

Grass Family

Muhlenbergia schreberi
Perennial

Other common names: Wiregrass, Dropseed.

Narrowly elliptical. Palea convex, with short, stiff hairs on the keel nerves. Lemma dull, three-nerved, sparsely covered with short, stiff hairs and tipped with a long, delicate, minutely barbed awn. Awn usually straight, as long or longer than the seed, and easily broken off in handling. Base sparsely covered with long, white hairs. Yellowish or silvery. 1.8-2.2mm long, 0.4-0.6mm wide.

STINKGRASS

Grass Family

Eragrostis cilianensis
Annual

Other common names: Lovegrass, Candygrass, Strong Scented Lovegrass, Skunkgrass, Snakegrass, Pungent Meadowgrass, Strong Scented Meadowgrass.

Seed unit usually a caryopsis because the lemma and palea are easily removed. Oval in outline with both the apex and base terminating in a tiny point. Oval in cross section. Surface covered with very fine longitudinal and transverse ridges giving a checkerboard pattern but which may sometimes appear as granular. Scutellum oval, oblique, with central ridge. Reddish-brown or orange-red. 0.6-0.9mm long, 0.4-0.9mm wide.



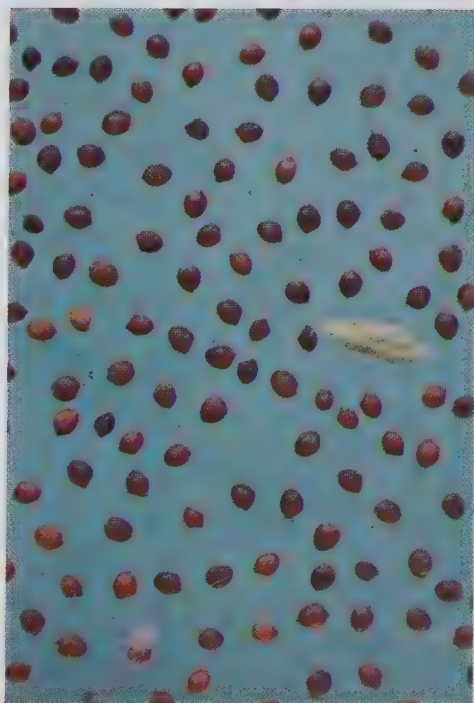
Witch Grass 5.8X
Panicum capillare



Fall Panicum 5.8X
Panicum dichotomiflorum



Nimblewill 5.8X
Muhlenbergia schreberi



Stinkgrass 5.8X
Eragrostis cilianensis

PRICKLY SIDA

Mallow Family

Sida spinosa
Annual

Other common names: Spiny Sida, Prickly Mallow, Thistle Mallow, False Mallow, Indian Mallow, Teaweed.

Broadly ovate in outline with two broad, flattened spinelike projections at the apex. The projections are granular and their inner margin bears short spines. Sector-shaped, the two faces of the ventral side forming a smooth, usually lighter colored, central ridge where they join. Surface dull, covered with a network of veins and relatively large but shallow interspaces. Brown to reddish-brown. 1.8-2.2mm long (excluding spines), 1.3-1.7mm wide.

FOXTAIL BARLEY

Grass Family

Hordeum jubatum
Perennial

Other common names: Wild Barley, Tickle Grass, Squirreldale Grass, Skunk Barley, Flickertail, Skunktail.

Occurs in crop seeds as a fertile floret or as a joint of the rachis consisting of a fertile spikelet with a sterile spikelet on each side.

Fertile floret elliptical, sessile, broadest at the middle or slightly below. Plano-convex. Palea flat, almost completely exposed, and has a prominent wrinkle. Pointed at the tip and rachilla about two-thirds to three-fourths the length of the palea. Yellow. 5.0-7.5mm long, 1.0-1.5mm wide.

The joint of the rachis consists of three spikelets. The sterile spikelets which flank the fertile floret are borne on a stalk, have unexpanded lemmas, and the glumes are reduced to long, flexible, awnlike structures.

LARGE CRABGRASS

Grass Family

Digitaria sanguinalis
Annual

Other common names: Crowfoot Grass, Finger Grass, Water Grass, Purple Crabgrass, Hairy Finger Grass, Crowfoot, Polish Millet, Pigeon Grass.

Narrowly elliptical in outline. First glume very small, narrower than the base; second glume narrow, about one-half the length of the spikelet, nerved, and margins covered with hairs; sterile lemma prominently nerved, margins covered with ascending hairs. Glumes and sterile lemma thin, tan colored. Fertile lemma covered with tiny tubercles giving a finely granular appearance. 2.5-3.5mm long, 0.9-1.1mm wide.

CHEAT

Grass Family

Bromus secalinus
Annual or Winter Annual

Other common names: Chess, False Wheat, Smooth Rye Brome, Soft Chess, Wheat-Thief, Williard's Bromegrass, Cockgrass.

Highly elongated, narrowly elliptical. Broadest above the middle, gradually tapered to rounded base and upward to bluntly pointed apex. Horseshoe-shaped in cross section. Lemma, palea, and grain about the same length. Lemma nerved, inrolled particularly in the lower one-half to three-fourths of the floret. The middle nerve of the lemma usually extends into an awn 3.0-6.5mm in length, but sometimes the awn may be lacking. Palea concave and margins with sparse, spiny hairs. Rachilla flat on the back, the front convex and bulged near the top. Callus not pointed. Grain has thick sides which are prominently inrolled, tip flattened, and a V-shaped furrow running down the center of the ventral side. Yellow to grey. 6.5-8.0mm long, 1.5-2.0mm wide.



Prickly Sida 3.6X
Sida spinosus



Foxtail Barley 3.6X
Hordeum jubatum



Large Crabgrass 3.6X
Digitaria sanguinalis



Cheat 3.6X
Bromus secalinus

PALE SMARTWEED

Buckwheat Family

Polygonum lapathifolium

Annual

Other common names: Purple Head, Annual Smartweed, Heart's Ease, Pale Ladysthumb, Dock Leaved Persicary, Willow Weed, Knotweed, Pale Persicaria.

Circular to ovate in outline with stout, pointed tip. Flattened with each face concave or sunken. Surface smooth, highly glossy. A remnant of the perianth usually remains attached to the base. Black to reddish-brown. 1.5-2.5mm long, 1.3-1.8mm wide.

LADY'S THUMB

Buckwheat Family

Polygonum persicaria

Annual

Other common names: Heartweed, Peachwort, Persicary, Spotted Knotweed, Smartweed, Heart's Ease, Spotted Smartweed, Heartweed, Peach Leaved Persicary, Red Shanks, Lover's Pride, Willow Weed.

Circular to ovate with a short, stout point at the apex. Flattened. Surface smooth, highly glossy. Remnant of the perianth usually remains attached to the base. Black to reddish-brown. 2.0-2.5mm long, 1.7-2.0mm wide.

PENNSYLVANIA SMARTWEED

Buckwheat Family

Polygonum pensylvanicum

Annual

Other common names: Bigseed Ladysthumb, Purple Head, Glandular Persicary, Heart's Ease, Swamp Persicary.

Circular to ovate in outline with short, pointed tip; flattened. Surface smooth, highly glossy; its faces not concave or sunken as with Pale Smartweed. A remnant of the perianth usually remains attached to the base. Black to reddish-brown. 2.8-3.5mm long, 2.6-3.0mm wide.

COMMON SMARTWEED

Buckwheat Family

Polygonum hydropiper

Annual

Other common names: Water Pepper, Biting Knotweed, Water Smartweed, Pepper Plant, Red Shanks.

Ovate, sharply tapered to a short point. Some seeds three-sided in cross section, others elliptical, but with one face more highly arched than the other. Surface dull, finely granular. A remnant of the perianth, whose surface is covered with resinous dots, usually remains attached to the base. Dark brown to black. 2.2-3.0mm long, 1.5-1.9mm wide.



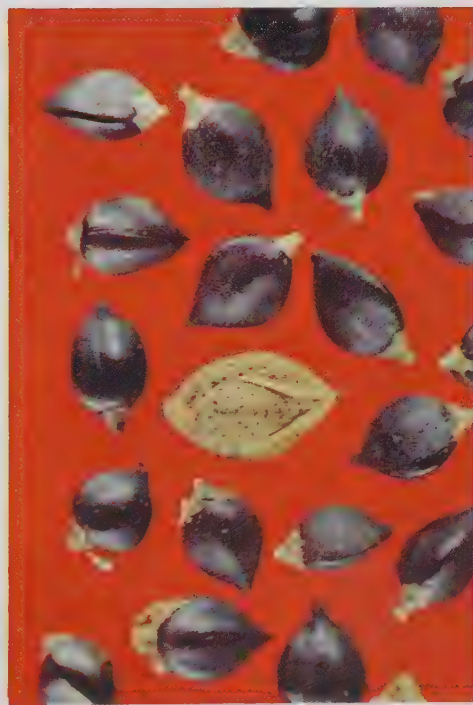
Pale Smartweed 5.8X
Polygonum lapathifolium



Lady's Thumb 5.8X
Polygonum persicaria



Pennsylvania Smartweed 5.8X
Polygonum pensylvanicum



Common Smartweed 5.8X
Polygonum hydropiper

VELVET LEAF

Mallow Family

Abutilon theophrasti
Annual

Other common names: Indian Mallow, Butterprint, Button Weed, American Jute, Pie Marker, Velvet Weed, Butter Weed, Indian Hemp, Cotton Weed.

Kidney-shaped in outline; thickest along the outer margin and usually with a rounded, concave area on each face. Surface generally with sparse, short hairs along inner margins of lobes; finely granular, and covered with variable-shaped, lighter colored, fungus-like growths. Seed stalk remnant runs along and is attached to the inner margin of the thinner lobe forming a narrow ridge and ends in a slightly extended point. A pad of tissue covers the indentation and is usually partially broken away from the seed at maturity. Greyish-brown to brownish-black. 3.0-3.6mm long, 2.2-2.6mm wide.

VENICE MALLOW

Mallow Family

Hibiscus trionum
Annual

Other common names: Flower-of-an-Hour, Shoo Fly, Bladder Ketmia, Browneyed Susan, Goodnight-at-Noon, Modesty.

Kidney-shaped in outline; thickest along the outer margin and tapered inward. Each face with a small concave area. Surface finely granular and roughened with warty, funguslike, usually circular growths. Seed stalk remnant runs from hilum along the inner edge of the thinner lobe forming a broad, rounded ridge and sometimes partially detached from the hilum. Dark brown to black. 2.0-2.5mm long, 1.6-2.0mm wide.

WILD ROSE

Rose Family

Rosa arkansana
Perennial

Other common names: Prairie Bramble, Briar Rose, Arkansas Rose, Running Briar Rose, Prairie Rose.

Roughly oval or ovate in outline; angular in cross section with dorsal side convex and ventral side two-faced part way or the entire length of the seed. Surface semi-glossy, slightly wrinkled with sparse, long hairs on the surface, and a tuft at the apex. Some hairs may be broken off in handling. Seed scar oval, raised. Yellow to brown. 3.5-4.5mm long, 2.4-3.0mm wide.

DRAGONHEAD MINT

Mint Family

Dracocephalum parviflorum
Annual or Biennial

Other common names: American Dragonhead, Dragonhead.

Obovate in outline; sector-shaped in cross section. The two ventral faces form a sharp, narrow, longitudinal ridge where they join. Dorsal-ventral margins may sometimes be slightly winged near the apex. Apex wavy or sometimes with one or two short teeth; tipped with a small, sometimes triangular area which has a "raw, roughened appearance" and is surrounded by a winged ridge on the dorsal side. Seed scar white, curved, elongated with the long axis running across the seed; frequently constricted at the center, roughly "dumb-bell" shaped, and with a central furrow. Surface granular. Dark brown. 2.1-3.0mm long, 1.2-1.8mm wide.



Velvet Leaf 3.6X
Abutilon theophrasti



Venice Mallow 3.6X
Hibiscus trionum



Wild Rose 3.6X
Rosa arkansana



Dragonhead Mint 3.6X
Dracocephalum parviflorum

INDIAN MUSTARD

Mustard Family

Brassica juncea
Annual or Winter Annual

Other common names: Leaf Mustard, Common Mustard, Chinese Mustard.

Globular or spheroid. Surface with network of fine, distinct veins and large, shallow interspaces. Reddish-brown to black. 1.5-2.0mm in diameter.

WILD MUSTARD

Mustard Family

Brassica kaber
Annual or Winter Annual

Other common names: Charlock, Field Kale, Field Mustard, Herrick, Skellick, Kedlock, Cadlock.

Globular or spheroid. Surface smooth or finely granular. Seed scar linear, white, even with the surface. Black or purplish-brown with immature seeds red. 1.3-1.7mm in diameter.

WILD RADISH

Mustard Family

Raphanus raphanistrum
Annual or Biennial

Other common names: Jointed Charlock, White Charlock, Jointed Radish, Wild Turnip, Wild Kale, Cadlock.

Seed unit in crop seeds may be the seed or a segment of the pod.

Seed oval to ovate in outline; oval in cross section. A broad, longitudinal rib runs along one edge. Surface covered with fine network of veins and shallow interspaces. Seed scar oval, usually located to one side of rather than the middle of the base. Brown to reddish-brown. 2.0-4.0mm long, 1.7-2.3mm wide.

Seed pods long, cylindrical, conspicuously ribbed and constricted between seeds. Mature pods break into segments at the points of constriction. Segments hard, difficult to break open, tan or greyish-brown. 5.0-6.0mm long, 3.0-4.0mm wide.

BLACK MUSTARD

Mustard Family

Brassica nigra
Annual

Other common names: Cadlock, Warlock, Scurvy, Senvil, Brown Mustard.

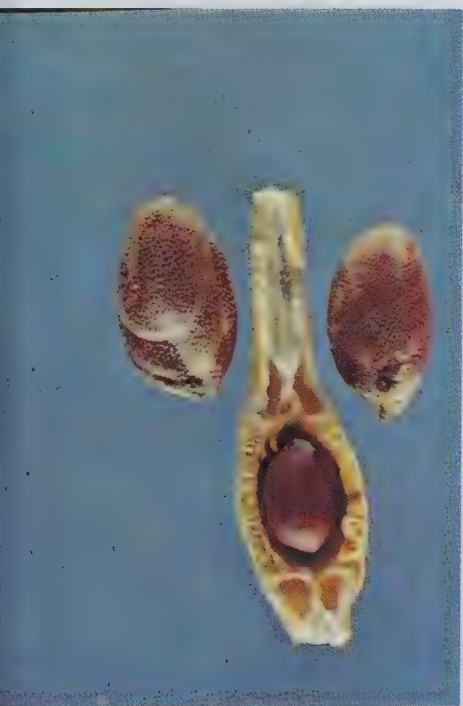
Oval in outline; circular in cross section. Surface covered with network of prominent, thick veins and small, deep interspaces. Reddish-brown and frequently darker near the hilum. 1.2-1.5mm long, 1.1-1.3mm wide.



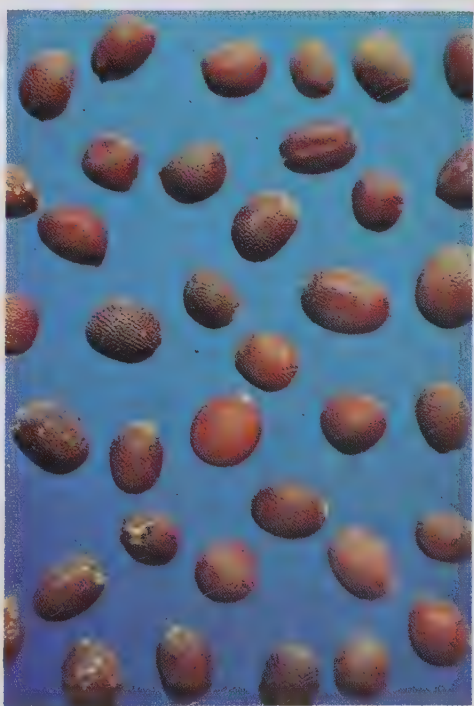
Indian Mustard 5.8X
Brassica juncea



Wild Mustard 5.8X
Brassica kaber



Wild Radish 5.8X
Raphanus raphanistrum



Black Mustard 5.8X
Brassica nigra

HOARY ALYSSUM

Mustard Family

Berteroa incana
Annual or Biennial

Other common names: Gray Berteroa.

Almost circular or obovate in outline. Flattened, but with both faces slightly convex. Surface dull, finely granular. Each face has a groove running inward from the hilum, parallel with the margin, to a point near the apex and marks the separation of the radicle from the cotyledons. Margins narrowly winged. A portion of the seed stalk frequently remains attached to the base. Reddish-brown to purplish-brown. 1.5-1.9mm long, 1.3-1.7mm wide.

YELLOW ROCKET

Mustard Family

Barbarea vulgaris
Winter Annual, Biennial, or Perennial

Other common names: Winter Cress, Wild Mustard, Rocket Cress, Herb Barbara, Common Winter Cress, St. Barbara's Cress, Bitter Cress, Yellow Weed, Water Mustard, Pot-Herb.

Oblong to oval in outline; dorsal side convex, ventral side is two-faced sloping from the middle toward each end of the seed. Faces form a rounded transverse ridge where they join. Apex may be rounded like the tip of a finger or straight across with rounded corners. A groove runs from the base to about the middle of the seed or slightly higher. Surface prominently roughened by numerous fine pits. A network of ridges and shallow interspaces may sometimes be evident but more frequently is obscured. Brown, covered with a whitish or yellowish, waxy material which gives the seed a greyish appearance. 1.5-1.9mm long, 0.8-1.0mm wide.

SMALL SEED FALSE FLAX

Mustard Family

Camelina microcarpa
Annual or Winter Annual

Other common names: False Flax, Small-Fruited False Flax, Dutch Flax, Western Flax, Siberian Oil Seed.

Oval to ovate in outline, but base somewhat truncate. In cross section, oval with a semi-circular top notch. Surface distinctly granular. Each face with a groove which runs, about parallel to the margin from the base to the apex and curves back to the base but is most prominent along the radicle. The radicle lies against the flat side of the cotyledons and forms a prominent rib which tapers from apex to the base. Dark reddish-brown with base extremity usually darker colored. 1.0-1.3mm long, 0.6-0.8mm wide.

LARGE SEED FALSE FLAX

Mustard Family

Camelina sativa
Annual or Winter Annual

Other common names: False Flax, Gold-of-Pleasure, Balloon Mustard, Dutch Flax, Wild Flax.

Oval to ovate in outline. In cross section, oval with semi-circular top notch. A groove runs from the base to the apex and recurves to the base separating the radicle from the cotyledons. The radicle appears to be folded over the top of the seed, narrows immediately below the apex, widens out, and then narrows down to a blunt tip; it lies against the flat side of the cotyledons and sometimes lies off-center. Surface dull, granular. Hilum usually light colored. Golden-brown to reddish-brown. 1.9-2.4mm long, 1.1-1.3mm wide.



Hoary Alyssum 5.8X
Berteroa incana



Yellow Rocket 5.8X
Barbarea vulgaris



Small Seed False Flax 5.8X
Camelina microcarpa



Large Seed False Flax 5.8X
Camelina sativa

SHEPHERD'S PURSE

Mustard Family

Capsella bursa-pastoris
Annual or Winter Annual

Other common names: St. James Weed, Shepherd's Pouch, Pepper Plant, Caseweed, Mother's Hearts, Shepherd's Bag, Pick Purse.

Oval to obovate in outline with base more or less truncate or notched and frequently with slight, white seed stalk remnant attached. Flattened, about the same thickness throughout (radicle lies against flat side of the cotyledons). Each face has a groove which runs, about parallel to the margin, from the base to the apex and recurves to the base. Surface finely roughened. Golden-brown to reddish-brown but usually darker near the base. 0.9-1.2mm long, 0.4-0.6mm wide.

VIRGINIA PEPPERWEED

Mustard Family

Lepidium virginicum
Annual or Winter Annual

Other common names: Wild Peppergrass, Annual Peppergrass, Large Peppergrass, Bird's Pepper, Pepperweed, Tongue Grass, Poor Man's Pepper, Peppergrass.

Obovate in outline; frequently with one margin convex, the other straight. Convex edge winged and the wing usually is lighter colored. Flattened in cross section, thickest at the cotyledon margin and tapering to the radicle margin. A single central groove runs inward from the hilum to about the upper one-fourth of the seed. The base may have a white, seed stalk remnant and it may be slightly notched. Surface dull, finely granular. Orange to reddish-yellow. 1.1-1.5mm long, 0.7-1.0mm wide.

FIELD PEPPERWEED

Mustard Family

Lepidium campestre
Annual or Winter Annual

Other common names: Cow Cress, English Peppergrass, Field Cress, Field Peppergrass, Poor Man's Pepper, Yellow Seed, Mithridate Mustard, Downy Peppergrass.

Obovate in outline; roughly circular in cross section. Convexly tapered from the apex to a pointed base. A light line runs inward from the hilum separating the radicle and the cotyledons. The radicle lies close to the cotyledons (against the flat side) and does not form a prominent, bulging rib; is about the same length as the cotyledons, its tip is flattened and lies on center. Surface dull, granular. Dark brown to reddish-brown. 2.0-2.5mm long, 1.1-1.5mm wide.

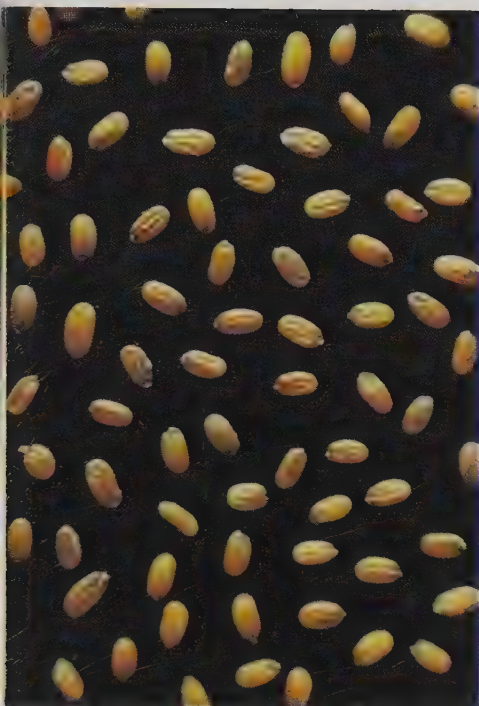
HOARY CRESS

Mustard Family

Cardaria draba
Perennial

Other common names: Perennial Peppergrass, Hoary Pepperwort, Whitetop, Whiteweed.

Oval to obovate in outline with rounded apex and notched base. In end view, the seed is flattened and sloping from the cotyledon edge to the radicle (radicle lies against the edges of the cotyledons). A groove runs from the base, gradually veering away from the margin and ending at about the middle or the upper one-fourth of the seed. Surface dull, finely granular. Dark reddish-brown or deep purplish-red. 1.8-2.2mm long, 1.0-1.5mm wide.



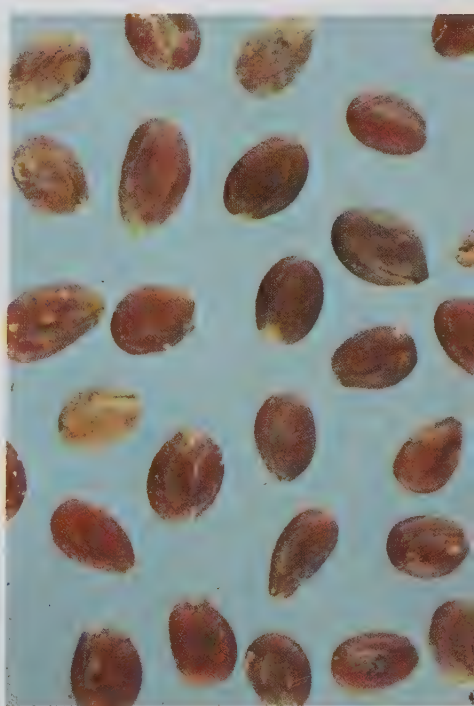
Shepherd's Purse 5.8X
Capsella bursa-pastoris



Virginia Pepperweed 5.8X
Lepidium virginicum



Field Pepperweed 5.8X
Lepidium campestre



Hoary Cress 5.8X
Cardaria draba

FLOWERING SPURGE

Spurge Family

Euphorbia corollata
Perennial

Other common names: Tramp's Spurge, Wild Hippo, Poison Milkweed, White Flowered Milkweed.

Broadly obovate in outline; about circular in cross section. Surface dull, covered with shallow, irregular pits or depressions. Hilum oblique, caruncle usually lacking. On one side of the seed is a seam or dark line (raphe) running from the hilum to the chalaza (a dark colored spot) on the opposite end of the seed. Greyish-white to brown or black with some seeds appearing as if they had been "rolled in flour." 2.0-2.5mm long, 1.3-1.5mm wide.

LEAFY SPURGE

Spurge Family

Euphorbia esula
Perennial

Other common names: Tithymal, Faitour's Grass, Wolf's Milk.

Broadly obovate in outline; about circular in cross section. Surface smooth. Hilum area almost vertical, seed scar usually covered with yellowish caruncle. On one side of the seed a prominent, dark seam or line (raphe) runs from the hilum to a prominent, circular, slightly depressed, rimmed chalaza area. Greyish-white to greyish-brown and usually mottled or flecked with brown. 2.0-2.5mm long, 1.3-1.5mm wide.

NODDING SPURGE

Spurge Family

Euphorbia nutans
Annual

Other common names: Upright Spurge, Spotted Spurge, Eyebright, Stubble Spurge, Slobber Weed.

Obovate in outline; four-sided. Each face is covered with a network of irregular cross ridges and concave depressions. Three angles are prominent, light-colored, longitudinal ribs and the fourth is a longitudinal groove or line. Chalaza inconspicuous, caruncle easily removed and usually absent. Greyish or dark brown. 1.1-1.5mm long, 0.6-0.9mm wide.

CYPRESS SPURGE

Spurge Family

Euphorbia cyparissias
Perennial

Other common names: Graveyard Spurge, Quack Salver's Grass, Salver's Spurge, Graveyard Weed.

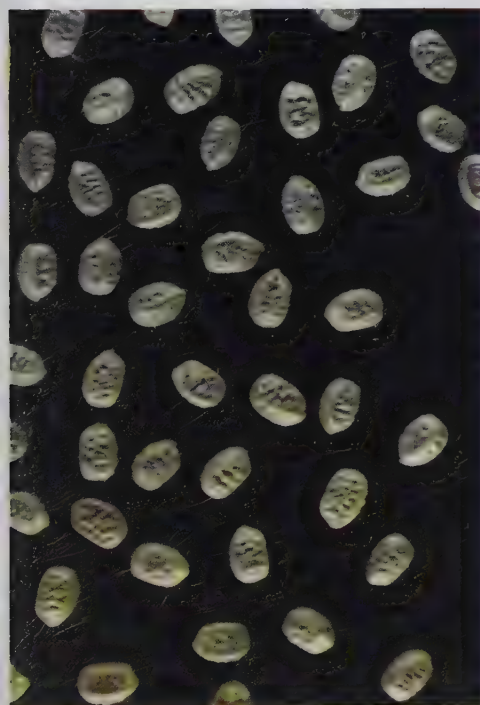
Broadly ovate or oblong in outline; about circular in cross section. Surface appears smooth but under certain light conditions and magnification a minute network of veins may be evident. Hilum lies in almost a vertical position and a yellowish-brown caruncle usually present. On one side of the seed, a seam or line (raphe), the same color as the seed, runs from the hilum to a circular, slightly depressed, and rimmed chalaza area. Reddish-brown or brown with a greyish cast. 1.8-2.1mm long, 1.2-1.5mm wide.



Flowering Spurge 5.8X
Euphorbia corollata



Leafy Spurge 5.8X
Euphorbia esula



Nodding Spurge 5.8X
Euphorbia nutans



Cypress Spurge 5.8X
Euphorbia cyparissias

Cenchrus pauciflorus
Annual

Other common names: Burgrass, Sandspur, Beargrass, Hedgehog Grass, Cockspur Bur, Sandbur Grass.

Seed unit in crop seeds is usually a caryopsis or spikelet. The caryopsis is broadly ovate in outline; plano-convex. The flattened (dorsal) side is slightly wrinkled and the margins are frequently slightly raised; convex ventral side is smooth. Scutellum is circular, black, and usually with a white tipped stalk remnant. A very short, needle-like appendage may be present at the apex. Tan or light brown. 2.6-3.5mm long, 2.0-3.0mm wide.

Spikelet ovate with long, sharp point. First glume much reduced or absent; second glume and sterile lemma about the same length, papery, nerved, slightly shorter than the fertile lemma, usually loose and easily removed in handling. Callus oval, straw-colored. 5.0-6.0mm long, 2.0-2.6mm wide.

PUNCTURE VINE

Caltrop Family

Tribulus terrestris
Annual

Other common names: Caltrop, Mexican Sandbur, Ground Bur Nut, Land Caltrop.

Each bur is triangular in outline with a long, hard, smooth, sharp spine originating from each of two corners. Margin between the two spines is bulged in the center and usually bears several shorter spines. Flattened in cross section. Surface covered with short hairs giving a velvety appearance. A prominent ridge runs longitudinally through the center of each bur. Each pod consists of five burs which break off at maturity. The spines are 3.3-4.0mm long and hard enough to puncture the sole of a shoe or small tires. Yellowish-brown to brown. 4.0-5.0mm long and about the same width.

JOHNSON GRASS

Grass Family

Sorghum halepense
Perennial

Other common names: Egyptian Millet, Syrian Grass, False Guinea Grass, Morocco Millet, Arabian Millet, Aleppo Grass, Means Grass, Evergreen Millet, Millet Grass.

Appears in crop seeds as a spikelet and a hulled grain, but more frequently as the former.

Spikelet elliptical in outline and the apex usually sharp pointed; plano-convex. Surface smooth, glossy. Mahogany colored shading to a reddish-brown or yellow with some spikelets mostly yellow. Two rachilla segments with expanded tops and frequently covered with hairs are usually present. 4.3-5.5mm long, 1.5-2.0mm wide.

Hulled grain obovate in outline with bluntly pointed base. In edge or lateral view, one margin is straight and the other convex but with both ends of the seed thick. Surface finely ridged longitudinally. Scutellum area oval or obovate with a distinct margin and the radicle appears as a distinct ridge. Deep reddish-brown shading to light brown near the scutellum. 2.0-3.0mm long, 1.3-1.8mm wide.

WILD LICORICE

Pulse Family

Glycyrrhiza lepidota
Perennial

Other common names: Licorice Root, American Licorice, Sweet Root.

Kidney or ear-shaped in outline with one or both ends a straight edge. Surface finely roughened, dull. One face or side bulged out or more convex than the other. Radicle thick, about one-half the length of the seed, and ending in a blunt tip which diverges from the cotyledons. Hilum a deep, circular cavity. Greenish-yellow with a lighter colored band encircling the hilum. 3.0-4.0mm long, 2.0-2.8mm wide.



Field Sandbur 3.6X
Cenchrus pauciflorus



Puncture Vine 3.6X
Tribulus terrestris



Johnson Grass 3.6X
Sorghum halepense



Wild Licorice 3.6X
Glycyrrhiza lepidota

CANADIAN MILK VETCH

Pulse Family

Astragalus canadensis
Perennial

Other common names: Canadian Rattle Weed.

Kidney-shaped in outline but not symmetrical in shape. Radicle tip strongly divergent from the cotyledons; radicle about one-half the length of the cotyledons. Radicle end of the seed usually not as rounded as the cotyledon end. Hilum tiny, circular or oval, and lies in a deep indentation. Each face slightly convex and usually slightly depressed near the indentation. Surface smooth, dull, but may become semi-glossy as a result of handling. Yellow to yellowish-brown, but lighter colored in the immediate area of the indentation. 1.6-2.0mm long, 1.0-1.5mm wide.

COMMON EVENING PRIMROSE

Evening Primrose Family

Oenothera biennis
Biennial

Other common names: Field Primrose, Tree Primrose, Willow Herb, Night Willow Herb, Evening Primrose, Fever Plant, Coffee Plant.

Shape highly variable including trapezoids, parallelograms, rectangles, and crescents. Margins winged. Surface dull, wrinkled and giving a granular or sometimes an irregular ribbed appearance. Reddish-brown. 1.5-1.7mm long, 0.9-1.3mm wide.

CATNIP

Mint Family

Nepeta cataria
Perennial

Other common names: Catmint.

Oval in outline; dorsal side convex, ventral side appears as convex or two-faced with broad, rounded, central ridge. Surface dull, granular. Dark, reddish-brown with two distinguishing white spots (seed scars) at the base of one face. 1.1-1.5mm long, 0.9-1.1mm wide.

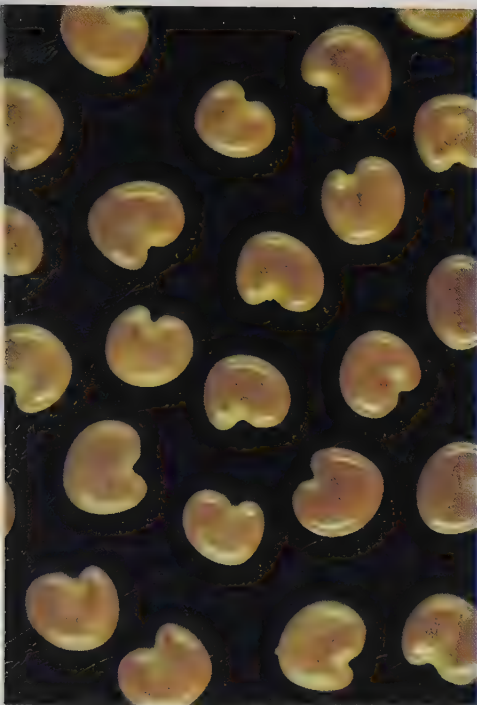
WATER HOREHOUND

Mint Family

Lycopus virginicus
Perennial

Other common names: Bugleweed, Ditch Horehound, Virginia Horehound, Buglewort, Paul's Betony.

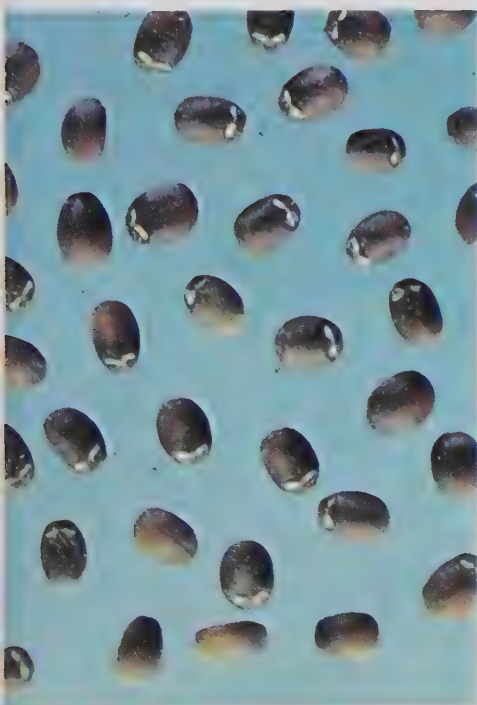
Triangular or sector-shaped in outline; plano-convex. Flattened face usually with broad, lighter colored band along the margins. Convex side sometimes two-faced. Margins thickly winged. Surface granular, convex face frequently with gold flecks. Hilum area circular, a deep cavity, oblique, light colored. Light brown. 1.0-1.3mm long, 0.6-1.0mm wide.



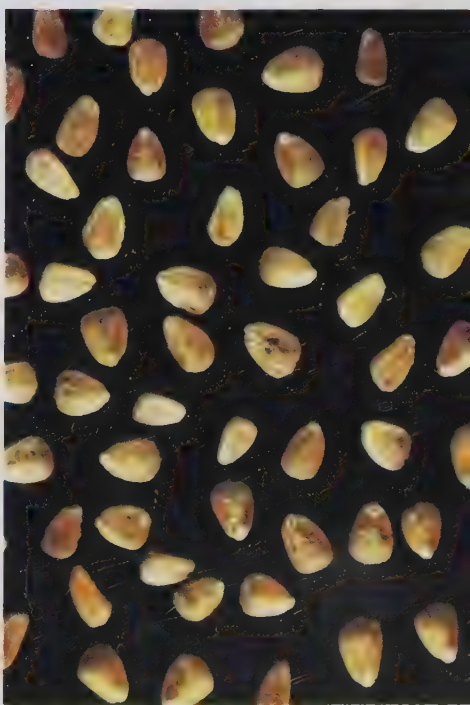
Canadian Milk Vetch 5.8X
Astragalus canadensis



Common Evening Primrose 5.8X
Oenothera biennis



Catnip 5.8X
Nepeta cataria



Water Horehound 5.8X
Lycopus virginicus

Thlaspi arvense
Annual or Winter Annual

Other common names: Frenchweed, Stinkweed, Fanweed, Bastard Cress, Pennycress, Mithridate Mustard, Stinking Mustard, Wild Garlic.

Oval to ovate in outline with slightly elongated, blunt base which frequently has a white, seed stalk remnant attached. Flattened, narrowly oval in cross section. Surface roughened by concentric ridges which are transversely grooved. Each face has a narrow groove which runs from the hilum to about the middle of the seed. Reddish-brown to black. 1.6-2.0mm long, 1.1-1.4mm wide.

YELLOW WOOD SORREL

Wood Sorrel Family

Oxalis stricta
Annual or Perennial

Other common names: Sheep Sorrel, Sheep Shower, Sour Grass, Sheep Poison, Upright Wood Sorrel.

Oval to ovate in outline; rounded at the apex and the two margins evenly and convexly tapered to a bluntly, pointed base. Flattened. Surface with deep, broad, wavy, transverse ridges and several fine, longitudinal ridges. Brown. 1.3-1.5mm long, 0.9-1.1mm wide.

MEXICAN PRICKLE POPPY

Poppy Family

Argemone mexicana
Annual or Biennial

Other common names: Devil's Fig, Prickle Poppy, Thistle Poppy, Mexican Poppy.

Globular with an extended, short, pointed base. Surface with conspicuous network of fine ridges; interspaces large, definite, smooth, and with a slight sheen. A portion of the surface has a number of longitudinal ridges, usually four to seven, that are arranged like the longitudinal lines on a globe and are joined by transverse ridges resulting in a series of rectangles. The remainder of the surface lacks the longitudinal pattern and is covered with an irregular network of ridges. Hilum elongated, depressed, and surrounded by a paperlike ridge. A thin corklike ridge or wing runs from the base to about the upper one-fourth of the seed. Brownish-black to black. 1.6-1.9mm in diameter.

GOOSEGRASS

Grass Family

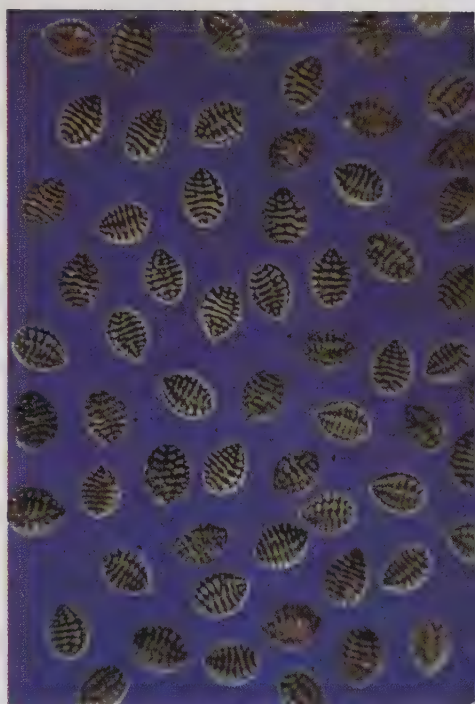
Eleusine indica
Annual

Other common names: Wiregrass, Yardgrass, Silver Crabgrass, Crowfoot Grass, Crabgrass, Indian Eleusine.

Seed unit usually is a caryopsis or grain. Ovate in outline; ventral side with a broad, deep, central, longitudinal furrow. Dorsal side sharply convex and with a central, longitudinal ridge. Surface striate and with prominent, concentric ridges. Scutellum oblique, depressed and with root-shoot axis a prominently raised ridge. Reddish-brown to reddish-black. 1.0-1.5mm long, 0.9-1.1mm wide.



Field Pennycress 5.8X
Thlaspi arvense



Yellow Wood Sorrel 5.8X
Oxalis stricta



Mexican Prickle Poppy 5.8X
Argemone mexicana



Goosegrass 5.8X
Eleusine indica

HARE'S EAR MUSTARD

Mustard Family

Conringa orientalis
Annual or Winter Annual

Other common names: Klinkweed, Hare's-Ear Cabbage, Rabbit-Ears, Treacle Mustard.

Roughly oblong or oval. Radicle thick, lies against the flat side of the cotyledons and forms a prominently bulged rib which is frequently slightly longer than the cotyledons. The tip of the radicle is not flattened and it usually lies off center. On each side is a groove which extends almost to the apex. Surface dull and granular. Dark brown or dark reddish-brown and sometimes lighter in the hilum area. 2.2-2.8mm long, 1.0-1.3mm wide.

DOG MUSTARD

Mustard Family

Erucastrum gallicum
Annual

Other common names: None in general usage.

Oval to obovate in outline with base somewhat truncate. Surface granular or faint, irregular lines may sometimes appear on the surface of the seed. Each face has a groove which starts at the base and runs, about parallel to the margins, to the apex and recurves to the base. The radicle lies along the flat side of the cotyledons and forms a prominent rib. Golden-brown to light brown with the ends of the cotyledons and radicle a darker brown. 1.0-1.2mm long, 0.6-0.8mm wide.

TUMBLE MUSTARD

Mustard Family

Sisymbrium altissimum
Annual or Winter Annual

Other common names: Tall Hedge Mustard, Jim Hill Mustard, Tall Sisymbrium.

Shape variable but frequently oblong in outline; the apex rounded like the tip of a finger or oblique with rounded corners. Some seeds with one margin convex, the other almost straight. In edge view, the ventral face is prominently humped with a rounded, transverse rib in the middle and sloped downward toward each end giving a "roof" shaped appearance. Transverse rib usually not sharp as in Hedge Mustard. A groove runs from the base to near the apex marking the separation of the radicle from the cotyledons (radicle lies against the flat side of the cotyledons). Surface dull, finely granular. Yellowish-brown to light brown but usually darker colored at the base. 0.8-1.1mm long, 0.5-0.6mm wide.

HEDGE MUSTARD

Mustard Family

Sisymbrium officinale
Annual or Biennial

Other common names: Bank Cress, Scrambling Rocket.

Generally oblong in outline; the apex rounded like the tip of a finger or oblique with rounded corners. Some seeds with one margin convex, the other almost straight. In edge view, the ventral face is prominently humped with a transverse ridge in the middle and sloped downward toward each end giving a "roof" shaped appearance. A groove runs from the base to near the apex marking the separation of the radicle from the cotyledons (radicle lies against the flat side of the cotyledons). Surface granular but sometimes with fine longitudinal lines on part of the seed. Greenish-brown, brown, or dark reddish-brown. 1.1-1.5mm long, 0.7-0.9mm wide.



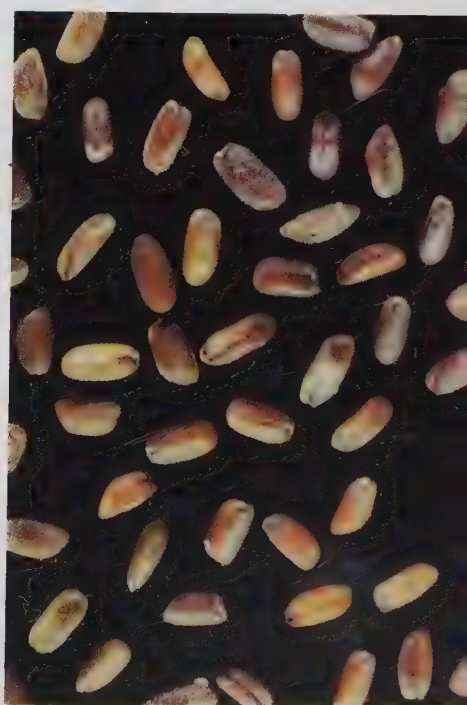
Hare's Ear Mustard 5.8X
Conringa orientalis



Dog Mustard 5.8X
Erucastrum gallicum



Tumble Mustard 5.8X
Sisymbrium altissimum



Hedge Mustard 5.8X
Sisymbrium officinale

Euphorbia marginata
Annual

Other common names: Mountain Snow, White-Margined Spurge.

Broadly obovate in outline with slightly extended, flattened base; about circular in cross section. Surface roughened by irregular coarse ridges, and sparsely covered with pointed, broad, upraised areas, the interspaces granular or pebbled. Hilum area oblique, seed scar elliptical, brown. On one side of the seed a dark seam or line (raphe) runs from the hilum to the chalaza. Caruncle absent. Chalk colored to light brown, some seeds with tiny, brown flecks. 3.0-4.0mm long, 2.1-3.0mm wide.

AMERICAN GERMANDER

Mint Family

Teucrium canadense
Perennial

Other common names: Wood Betony, Wood Sage.

Obovate or oval in outline; apex rounded and thick. Hilum area large, frequently extends to almost one-half the length of the seed, its margins clearly marked by a sunken border, bulged in the middle and with a rounded, central ridge on which is a linear seed scar. Surface covered with a network of veins or ridges, the interspaces large and granular. Light brown to dark brown. 1.5-2.0mm long, 1.0-1.2mm wide.

ST. JOHN'S WORT

St. John's Wort Family

Hypericum perforatum
Perennial

Other common names: Klamath Weed, Penny-John, Rosin, Rosin-Rose, Speckled John, John's-Wort, Herb-John, Amber, Tipton Weed, Goat Weed, Eola Weed.

Oblong in outline; circular in cross section. Apex rounded with short, fine tip; base rounded and with stout seed stalk remnant. Some seeds curved. One margin frequently has a lighter colored, membranous wing or ridge. Surface roughened by a fine network of veins which is evident under magnification, and coated with resinous material which gives a slightly glossy appearance. Dark brown to black. 1.0-1.3mm long, 0.4-0.5mm wide.

WOOD RUSH

Rush Family

Juncoides campestre
Perennial

Other common names: None in general usage.

Ovate to oval in outline; dorsal side convex, ventral side two-faced. Apex tipped with prominent, white, roughly triangular-shaped tissue (caruncle). Surface with numerous, fine, longitudinal ribs. Reddish or purplish-red. 1.5-2.0mm long, 0.7-0.9mm wide.



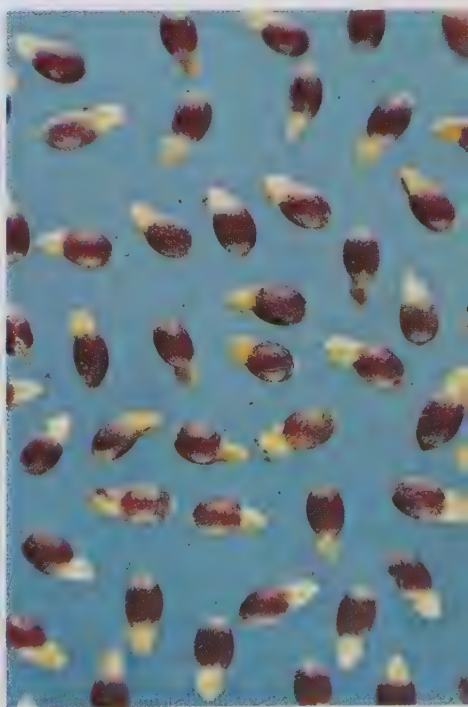
Snow-on-the-Mountain 5.8X
Euphorbia marginata



American Germander 5.8X
Teucrium canadense



St. John's Wort 5.8X
Hypericum perforatum



Wood Rush 5.8X
Juncoides campestre

HEMPNETTLE

Mint Family

Galeopsis tetrahit

Annual

Other common names: Red Hemp Nettle, Dog Nettle, Bee Nettle, Wild Hemp, Bastard Hemp, Stinging Nettle, Blind Nettle, Nettle-Wild, Hemp Dead Nettle, Flowering Nettle, Ironweed.

Obovate in outline. Dorsal side convex, ventral side two-faced in the lower one-half or two-thirds of the seed and the upper part usually rounded. Lower part of the seed sector-shaped, upper part elliptical in cross section. Surface roughened. Base truncate; hilum lies in oblique position, is sector-shaped in outline, depressed, and surrounded by a papery ridge. The surface frequently appears as if a reddish-brown seed has been rolled in light grey paint. Greyish-brown. 2.5-3.2mm long, 1.5-2.0mm wide.

BLACK MEDIC

Pulse Family

Medicago lupulina

Annual, Winter Annual, or Short-Lived Perennial

Other common names: Hop Medick, Yellow Trefoil, None-Such, Black-Seed Hop Clover, Black Clover.

Kidney or ear-shaped in outline. Radicle about two-thirds the length of the seed, lies next to the cotyledons, but diverges at tip forming a small notch and point. A light-colored line marks the separation of the radicle and the cotyledons. Surface dull, smooth. Hilum area a circular cavity. Greenish-yellow. 1.5-2.0mm long, 1.0-1.5mm wide.

SENSITIVE PEA

Pulse Family

Cassia nictitans

Annual

Other common names: Wild Sensitive Plant, Partridge Pea.

Rhombic in outline. Flattened, margins winged. Surface with curved rows of shallow depressions; glossy. Dark brown to mahogany with lighter colored wings. 3.0-4.0mm long, 2.2-2.8mm wide.

NARROW LEAF VETCH

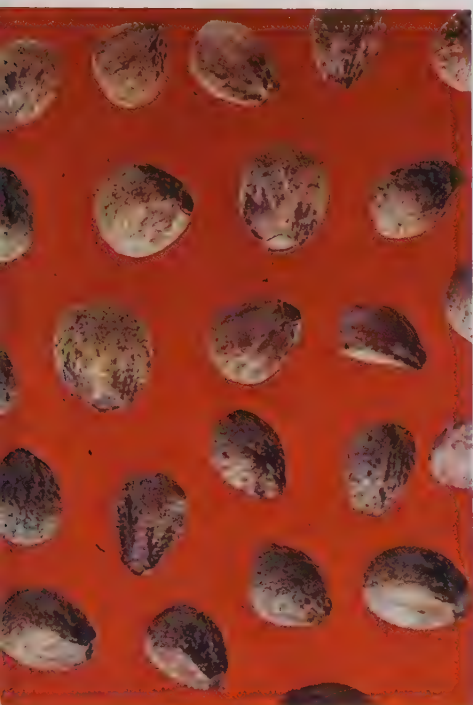
Pulse Family

Vicia angustifolia

Annual

Other common names: Wild Pea, Buffalo Pea, American Vetch, Purple Vetch, Wild Vetch, Wild Tare.

Globular. Surface usually dull, finely granular. Hilum about 2.0mm long, ~.75mm wide at widest part, one end tapered to a blunt point, centrally grooved, slightly depressed at its margins but convex. Chalaza a dark colored, raised point. Brownish-black to olive-brown or brown, sometimes mottled with black. 2.7-3.6mm in diameter.



Hempnettle 3.6X
Galeopsis tetrahit



Black Medic 3.6X
Medicago lupulina



Sensitive Pea 3.6X
Cassia nictitans



Narrow Leaf Vetch 3.6X
Vicia angustifolia

AMERICAN PENNYROYAL

Mint Family

Hedeoma pulegioides
Annual

Other common names: Pennyroyal, Pudding Grass, Tickweed, Stinking Balm, Mosquito Plant, Mock Pennyroyal, Squaw Mint.

Oval to obovate in outline; apex rounded, base slightly elongated. Ventral side becomes two-faced in the lower one-half of the seed. Upper part of the seed oval in cross section, lower part part sector-shaped. Hilum area broadly triangular, oblique, with sharp, central ridge. Surface dull, finely granular. Brownish-black. 0.9-1.1mm long, 0.5-0.8mm wide.

MOTHERWORT

Mint Family

Leonurus cardiaca
Perennial

Other common names: Lion's Tail, Lion's Ear, Common Motherwort, Cowthwort.

Wedge-shaped or broadly triangular in outline; sector-shaped in cross section. Apex truncate, slightly oblique, with wavy or toothed collar, and bearing a tuft of short hairs. Base narrow, oblique, and truncate. Surface roughened with sparse tubercle-like projections and with "varnished" appearance. Dark brown to reddish-brown. 1.7-2.0mm long, 1.1-1.3mm wide.

HEAL-ALL

Mint Family

Prunella vulgaris
Perennial

Other common names: Self-Heal, Blue Curls, Carpenter's Weed, Dragon Head, Sickletwort, Hock-Heal, Heart-of-the-Earth.

Obovate or oval in outline; sector-shaped in cross section. Dorsal side slightly convex, ventral side two-faced with a central, rounded, longitudinal ridge. Surface slightly roughened, glossy. Brown to reddish-brown with two narrow, longitudinal stripes down the center of both the dorsal and the ventral sides and also along the margins. A white seed stalk with V-shaped tip is usually present. 1.6-2.2mm long, 0.9-1.1mm wide.

LANCELEAF SAGE

Mint Family

Salvia reflexa
Annual

Other common names: Sage Mint, Rattle Sage.

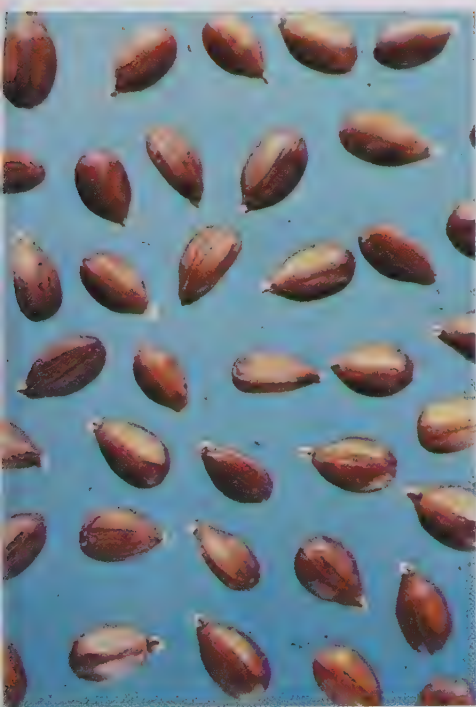
Broadly ovate in outline; broadly sector-shaped in cross section. The two faces of the ventral side form a rounded, longitudinal ridge where they join. Surface dull, smooth. A conical remnant of the seed stalk usually remains attached to the hilum. Tan to light brown with dark brown, zigzag lines or pattern. 2.0-2.4mm long, 1.4-1.6mm wide.



American Pennyroyal 5.8X
Hedeoma pulegioides



Motherwort 5.8X
Leonurus cardiaca



Heal All 5.8X
Prunella vulgaris



Lanceleaf Sage 5.8X
Salvia reflexa

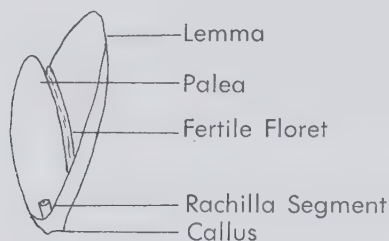
GLOSSARY

- ACUTE** — sharp or pointed.
- ANGULAR** — sharp-cornered.
- APEX** — the top or tip of a seed.
- APPENDAGE** — an attachment or extension to the main body of the seed.
- ASCENDING** — pointing upward.
- AWN** — a slender bristle at the tip or arising from the back of the lemma or glume of a grass spikelet.
- BARBED** — bearing short, rigid bristles.
- BEAKED** — ending in a prolonged tip or projection.
- BONY** — hard.
- BRISTLE** — a stiff hair.
- CALYX** — the outer ring of floral parts or all of the sepals considered together.
- CAPPED** — the top or tip covered with tissue which differs in nature or form from that which bears it.
- CARUNCLE** — an abnormal growth around or near the hilum.
- CHALAZA** — that point of the seed where the integuments and nucellus are joined and which in many legume seeds is raised or slightly bulged.
- CLUB-SHAPED** — shaped like a club or baseball bat.
- COLLAR** — a band encircling the upper part of the seed.
- CONCAVE** — surface curved downward or hollowed.
- CONCENTRIC** — curved or circular.
- CONICAL** — circular in cross section and gradually tapering to one end of the seed.
- CONSTRICTED** — contracted or pulled together.
- CONVEX** — surface curved upward or bulged.
- COTYLEDON** — the seed leaf or the first leaf of the embryo.
- CYLINDRICAL** — a body circular in cross section and of the same diameter throughout its length.
- DAGGER-SHAPED** — shaped like a dagger; long, slender, gradually tapered from the apex to a point.
- DISK SEED** — seed produced by the inner, tubular flowers of a composite inflorescence (head).
- DIVERGENT** — extending away from a given point or line.
- DORSAL** — the back of a seed.
- ELLIPTICAL** — broadest near the middle with the sides tapering equally to a point — has the form of an ellipse.
- EMBRYO** — the young, dormant plant of a seed.
- ENDOSPERM** — the food supply surrounding the embryo.
- FACE** — refers to the wide side of the seed.

FAN-SHAPED — narrow at the base with both sides gradually diverging to a wide apex.

FLARED — curved outward.

FLORET — a small flower. In grasses it consists of the pistil, stamens, and lodicules enclosed by the lemma and palea. In the seed key it refers to the mature, fertile floret which includes the caryopsis or grain, lemma, palea, and rachilla segment.



Fertile Floret

FUNICULUS — the stalk which attaches the seed (ovule) to the ovary.

GLABROUS — free of hair or pubescence.

GLOBULAR — shaped like a globe — spherical.

GLUME — the empty bracts at the base of a grass spikelet.

GRANULAR — roughened as if covered by granules or grains — like sandpaper.

HILUM — the scar on the seed surface at which place the mature ovule (seed) was attached to seed stalk.

HOOKED — a structure with a recurved end.

INROLLED — the edge or edges rolled toward the middle.

INTERSPACE — the space between the veins or nerves on the surface of the seed.

KEEL — a ridgelike projection or fold like the keel of a boat.

LANCEOLATE — widest below the middle and gradually tapered to the apex and sometimes slightly to the base.

LEMMA — the lower of the two bracts which enclose the grain of the grass floret.

LENS-SHAPED — two faces convex, broadest near the middle with the faces tapering about equally to flattened margins.

LONGITUDINAL — running lengthwise of the seed.

LUSTROUS — shiny or glossy.

MARGIN — the edge or edges of the seed.

MEMBRANEOUS — a thin, transparent tissue.

MINUTE — very small; tiny.

MOTTLED — covered with blotches or spots of a different color or colors.

MULTI-COLORED — consisting of varied colors.

- NERVE** — the veins or ribs on the glumes or lemmas of the seed or on the seed pods.
- OBLIQUE** — slanting or inclined.
- OBLONG** — longer than wide with the sides about parallel.
- OBOVATE** — inverted egg-shaped — broadest near the apex.
- OBTUSE** — blunt or rounded.
- OVAL** — broadly elliptical.
- OVATE** — egg-shaped — broadest near the base.
- PALEA** — the upper of the two bracts which enclose the grain of the grass floret.
- PAPPUS** — a structure of bristles, hairs, scales, teeth, or awns at the tip of the seed (achene) of the composites.
- PEBBLED** — roughened with pits or a granulated structure.
- PEDICEL** — the stalk of a single flower or spikelet.
- PEG-SHAPED** — shaped like a narrow triangle or wedge.
- PERIANTH** — that part of the flower including the calyx and the corolla.
- PERICARP** — the wall of a mature ovary.
- PERIPHERY** — the external boundary.
- PITTED** — the surface of the seed covered with hollow depressions.
- PLANO-CONVEX** — in cross section one side flat the other convex.
- PLATE-LIKE** — a thin, raised area on the seed surface.
- PROTUBERANCE** — a projection on the surface of the seed.
- PYRAMIDAL** — a body with a flat base and its sides consisting of several triangles which join at a common point.
- RACHILLA** — the axis or stalk of a spikelet.
- RADICLE** — the undeveloped root of the embryo of the seed.
- RAPHE** — a seam or furrow which runs from the hilum to the chalaza on some legume seeds.
- RAY SEED** — seed produced by the marginal, petal-like flowers of a composite inflorescence (head).
- RECTANGULAR** — a four-sided figure all of whose angles are right angles.
- REMNANT** — that part which remains or is left over.
- RESINOUS** — bearing a resin-like material similar in nature to rosin or shellac.
- RHOMBIC** — shaped like an equilateral parallelogram or roughly diamond-shaped.
- RIM** — a border or margin.
- ROLLED** — rolled as a newspaper or document.
- RUGOSE** — wrinkled.
- SCALES** — a small, flattened, hard layer.
- SCUTELLUM** — usually an oval area near the base of the dorsal side of the caryopsis or grain of most grasses.
- SECTOR** — shaped like a piece of pie.

SEED SCAR — (see hilum).

SEED STALK — the stalk which attaches the seed (ovule) to the ovary.

SEGMENT — a part of an object.

SINUS — the area between the lower margins of the lemma at the base of the floret.

SEMI-GLOSSY — with a slight sheen, but not highly lustrous.

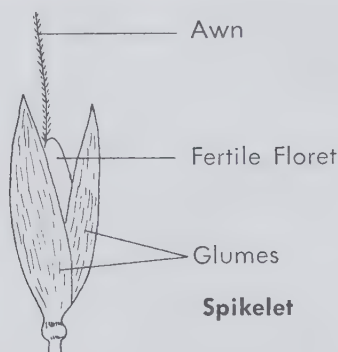
SERRATED — saw-toothed.

SESSILE — without a stalk, attached directly to the base.

SPHERICAL — globular. A body which has all points of its surface equidistant from its center.

SPHEROID — approximately or almost spherical.

SPIKELET — one or more florets enclosed by a pair of glumes.



SPINDLE-SHAPED — elongated and tapered on each end.

SPINE — a sharp, bony or hard growth.

STRIATE — with fine longitudinal ridges or lines.

STYLE — the slender portion of the pistil which connects the ovary with the stigma.

TOOTHED — with teeth.

TOPKNOT — a crest or tuft.

TRANSLUCENT — semi-transparent.

TRANSVERSE — across the seed.

TRAPEZIUM — a four-sided figure with no two parallel sides.

TRAPEZOIDAL — a four-sided figure with two parallel sides.

TRUNCATE — ending abruptly as if cut off.

TUBERCLE — a small, rounded projection or protuberance.

TUFT — a cluster or parachute of bristles, hairs, or scales.

URN-SHAPED — rounded at the bottom, gradually widening toward the top, and flared at the apex.

VARNISHED — semi-glossy but with more or less translucent appearance.

VEIN — rib or nerve on the outer parts of a spikelet.

VENTRAL — the front of a seed.

WINGED — a thin, membranous extension along the margins of the seed.

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